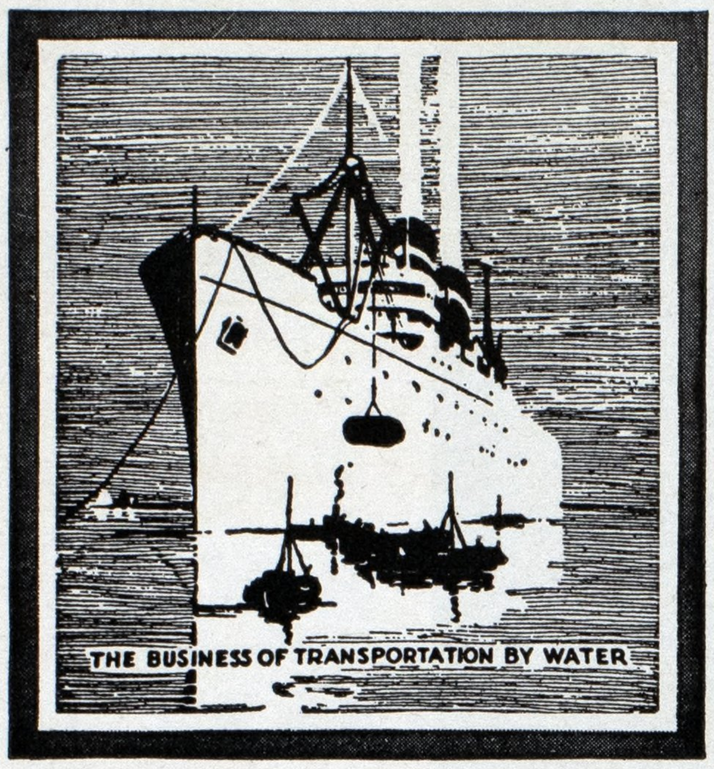
Marine Review

The National Publication Covering the Business of Transportation by Water

CLEVELAND FOUNDED 1878 NEW YORK



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H. O. Taylor

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Joseph Fuller, *Eastern Manager*
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London Office, Caxton House
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CONTENTS

Vol. 59 **November 1929** *No. 11*

	Page
Diesel Engines Predominate in World Shipbuilding.... By A. H. Jansson	**20**
Index to Diesel Ships	**21**
Fourteen Diesel Ships Featured, One to a Page	**23-38**
Pennsylvania Sails on Maiden Trip	**59**
Photographs, Interior, Pennsylvania	**61**
Steam or Diesel—A Comparison By Joseph Hecking	**62**
Naval Architects Meet in New York Nov. 14-15	**64**
Ohio River Opened with Nine-foot Stage By W. G. Gude	**65**
British Shipping Is Quite Active By Vincent Delport	**67**
Diesel Electric Main Propulsion—Reliable, Flexible By H. C. Coleman	**69**
Estep, H. Cole, (1886-1929), Obituary	**72**
Auxiliary Electrification on Diesel Ships By Frank V. Smith	**73**
Build Powerful Auxiliary Diesel Sets	**76**
Jeff Davis, Diesel Freighter Has Sea Trials	**77**
Repairs to Diesel Engines—How to Do By Louis R. Ford	**79**
Port Authorities Hold Convention	**81**
Lubrication for Diesel Engines, Part I	**82**
Maritime Law—Late Decisions on By Harry Bowne Skillman	**84**
Ports—Marine Business Condensed	**85**
New Construction, Ordered and Contemplated	**86**
Ship Construction Loans Made, Authorized or Pending	**87**
Stevedoring and Dock Management Progress	**88**
Handling Shipments of Pulpwood	
Paper Presented, A. S. M. E. by Daniel W. Coe	
Safety Engineering Applied to Marine Terminals By M. E. Arkills	
Receiving Freight at the Bulkhead	
Up and Down the Great Lakes	**91**
Personal Sketches of Marine Men	**94**
Joseph W. Powell, Chairman Executive Committee United Dry Docks, Inc. By Ben K. Price	
Diesel Electric Ferries for New York Completed	**96**
Standard Transportation Tug Launched	**98**
Cement Barge Completed at N. Y. Shipbuilding Co.	**100**

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Marine Diesel Engine

Insert section of the

November 1929 Issue

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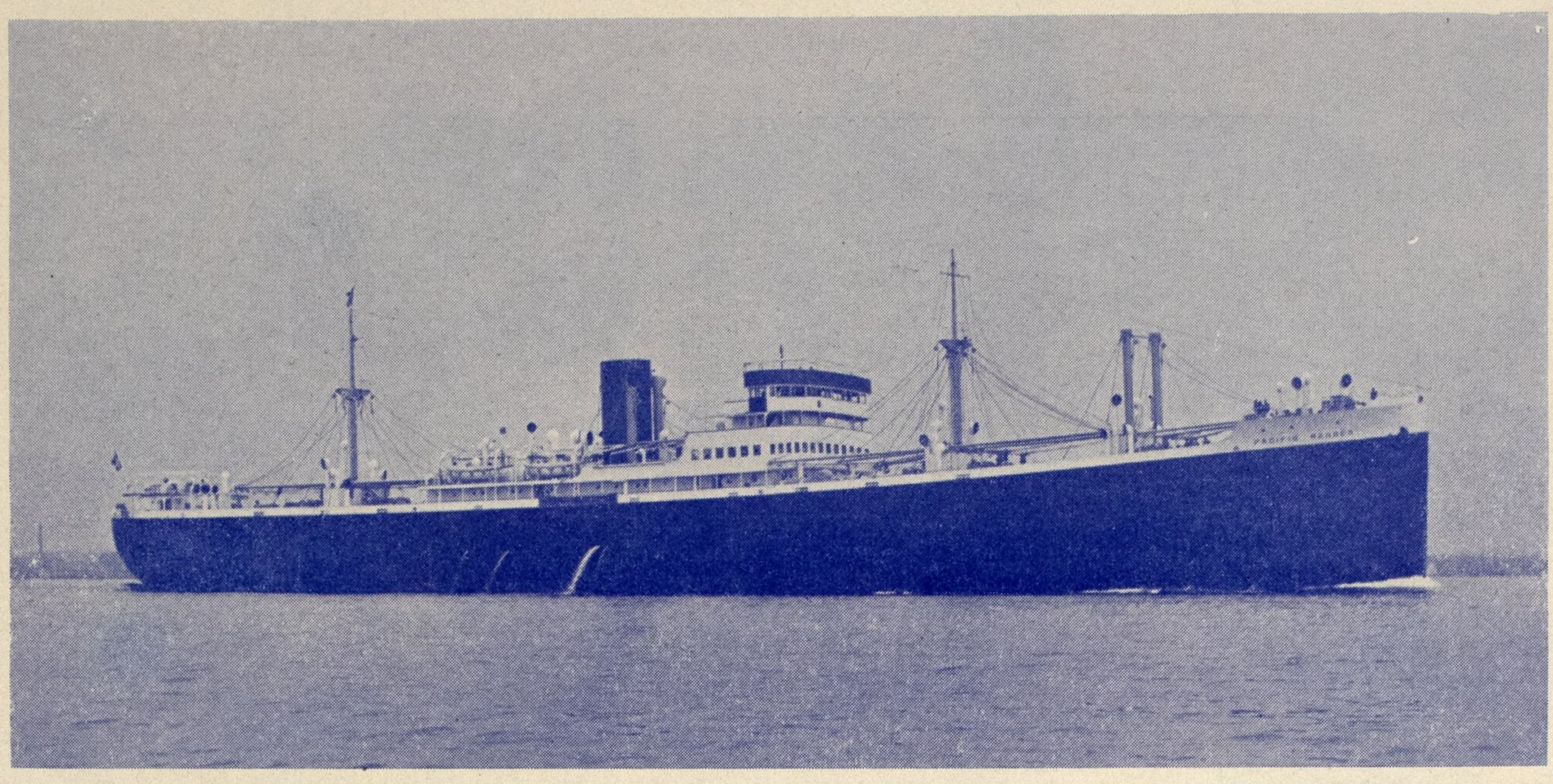
New York London Cleveland



Modern Foreign Built Twin Screw Passenger and Cargo Motorship Pacific Ranger—Service Speed 13 Knots

Diesel Engines Now Predominate in Total World Shipbuilding

IT IS clear that the diesel engine for larger ships has not taken on in the United States as it has in Great Britain and Europe. In considering the situation it is well to bear in mind that shipbuilding in the United States, since the postwar peak period, has been in lamentably poor condition. All that is necessary to show the relative lack of shipbuilding in the United States is to point to Lloyd's figures for Sept. 30, this year. The United States ranks seventh among all the maritime countries of the world in shipbuilding and it is less than a thousand tons in excess of Sweden. Consequently, it is not fair to appraise too definitely the standing of the diesel engine in the minds of American steamship owners and operators. However, based on such shipbuilding as there is, the diesel engine is not as popular with the American operator as it is with those abroad.

According to the same statement of Lloyd's referred above, only slightly more than 25 per cent of the present shipbuilding in the United States is of motor vessels. Compare this with 45 per cent in motor vessels of all the merchant shipbuilding now under way in Great Britain and Ireland and with 64 per cent of motorship construction for all the other maritime countries, including the United States. Taken together, Russia and Holland, for instance, are building about 80 per cent of present tonnage for internal combustion engine drive; also, Japan, Sweden and Denmark are building over 90 per cent of their total construction underway in diesel ships. Fifty-four per cent of all world shipbuilding is now in diesel vessels.

Relatively, in larger vessels, the United States is far behind Great Britain and the European nations in the adoption of the diesel engine for propulsion. What is the answer? Are the British and Europeans making a mistake in showing the confidence they do in the economy and dependability of the diesel engine? Is it because European and British engine builders can turn out better and cheaper diesel engines? Is it because the American steam engineer and electrical engineer are far ahead of their foreign contemporaries? Is it because the price of fuel abroad is a more important factor in the total operating cost? Is it because the men who actually operate ships abroad, due to competition, are forced to train themselves more thoroughly and are therefore better qualified and more willing to take the trouble and pains to operate diesel engines as they should be operated for success? Or is it the ingrained conservatism of the American shipping man? Strange as it may seem when you consider the progress made in America in engineering production and sales, the American who turns to the sea for the sphere of his activities seems to be an ultra conservative. He is much less inclined to take a chance on something new than his contemporary in a foreign country.

Shipbuilding in the United States

Some Vessels Built in 1929

Analysis—Motive Power

Type	Number	Recip.	Turbine	Diesel
Cargo.....	157	121	...	36
Pass. and cargo.	65	24	6	35
Passenger.....	2	...	1	1
Tanker.....	15	3	...	12
Special.....	57	48	2	7
Total.....	296	*196	9	91

*Of this number 9 were reciprocating-turbine combinations.

is now taking a definite turn for the better. Orders actually in hand and many others contemplated, in due course, will mean that the shipyards will be filled nearly to capacity before long. What effect will this increase in shipbuilding have on the chances for increased adoption of the diesel engine? We believe that this type of engine will be increasingly adopted in tankers from the largest to the smallest and in all types and sizes of cargo ships. There is, therefore, more opportunity at the present time for the acceptance of diesel engines for vessels of this type.

Present plans, except for tankers, are almost exclusively confined either to elaborate passenger ships or combination passenger and cargo ships. But the years are passing and the large fleet built by the shipping board, some of it now under private operation, is rapidly growing older and much of it is obsolete compared with the fine modern fast diesel freighter being turned out abroad. This large fleet must be replaced and in doing so, if we are to compete on an equal footing with other maritime nations, it will be necessary to build ships that are equal to theirs in economy, speed, size, cargo handling gear and all other equipment and arrangements of a ship which makes it attractive to the merchant or manufacturer for shipping his goods. We believe that in this category there is an immediate future in the United States for diesel engines up to 4000 horsepower.

In addition to great thermal efficiency and low fuel cost, there are other advantages in using the diesel engine which are bound to make themselves felt in any straight forward study of the economics of the situation. One important advantage is the much greater cruising radius which makes it possible to carry more cargo and also to buy the fuel at lowest cost and best quality. With the latest developments in the double acting engine, it is also possible to save in space and weight. There is still another very definite advantage in that the diesel engine is in itself the entire medium of changing fuel to power.

It is difficult to believe that all of the maritime countries, including the greatest of them all, are off on the wrong foot in building so large a proportion of all new ships with diesel drive. Even though Great Britain is a great coal producing country and has no oil within its island boundaries, nearly 50 per cent of all current merchant shipbuilding in that country is in motor vessels. No one can question the experience of Great Britain in shipbuilding and ship operation. It would seem that in many ways, conditions there are not nearly as favorable for the adoption of diesel drive as they are in the United States. Can one question the engineering and ship operating experience of old maritime nations, such as Holland, France, Japan, Russia and the Scandinavian countries? In these countries from 80 to 90 per cent of the total new shipbuilding now under way is in diesel engine ships. Against this, stands the United States with 25 per cent of its present shipbuilding in diesel engine vessels. What is the answer?

Certainly, the advances made by the internal combustion engine in marine service all over the world deserves the most careful study on the part of all Americans responsible for the choice of power in new ships contemplated. Every condition affecting operation of the proposed ship should be carefully analyzed. The actual operating experience with the latest diesel ships should be determined. The highest type of engineer without prejudice or fear should consider the problem from every angle. A stand-pat policy with as little change as possible from previous experience means non-progressiveness. The American operator with an open mind, after looking into all phases of this problem, may find that the adoption of the diesel drive will give him a very definite advantage over his competitors in reducing his cost of operation.

In the report of Lloyd's, which we have quoted above, it must be borne in mind that this far from represents all of the diesel building for marine purposes in the United States. As a matter of fact many smaller vessels are under construction in American shipyards for various domestic purposes which are fitted with diesel engines but are not included in this report.

A summary of all steel merchant shipbuilding in the United States for the past several years and taking into account all types of vessels including those for harbors, bays, rivers and other inland waterways indicates

Fourteen Diesel Ships

IN THE following pages recent marine diesel engine installations of 14 builders of this type of power unit are illustrated and described in uniform detail. Fourteen different makes of engines in as many different vessels give a true cross section of the present status of the industry in the United States. A separate page is devoted to each installation and the information given has been carefully selected to answer those questions in which every operator is interested. Furthermore, the vessel in which each engine is installed is sufficiently described and also illustrated to completely identify its type and service. The contents and manner of presentation will serve the useful purpose of aiding in the tentative selection of engines for new vessels or conversion.

Diesel Ships--Where To Find Them

Freighters

Name and Service	Page
Courageous, Ocean	23
Henrietta Frances, Bay	34
Potter, Ocean	38
Wichita, Ocean	24

Tankers

Blue Sunoco, Coast	25
Tidewater, Coast	36

Ferry

John M. Dennis, Bay	26

Dredges

Name and Service	Page
Calkins No. 5, Harbor	30
Keystone, Harbor	32
Las Cruces, Panama Canal	28
Mogul, Lakes	27

Towboat

Warrior, Rivers	29

Other Types

Chilkat, Ocean Tender	31
San Joao, Fishing Schooner	33

that there has been a steady increase in the percentage of vessels in which diesel engines have been installed. In this survey for the year 1927, 45 per cent of new construction in this category, which included all powered merchant vessels, 100 tons and over, built of steel, was fitted with the diesel engine as primary power. A similar survey for the year 1928 indicates that 50 per cent had diesel drive for primary power. In this connection it is interesting to note that diesel direct drive accounted for 31 per cent, the remaining 19 per cent being diesel electric.

While the American seagoing steamship operators and owners have been, to say the least, luke warm to the diesel engine, a great army of operators of craft for harbors, bays, rivers and inland waters is being steadily converted to the adoption of the diesel engine. It would probably be fair to say that eight out of every ten new tugboats, for instance, would be diesel drive. Smaller vessels everywhere on rivers, lakes and canals are fast becoming dieselized. The units are comparatively small, easy to operate and economy in fuel is so evident that it can no longer be ignored. From 1500 horsepower down, the market for marine diesel engines in the United States is probably far greater than it would be in any European country.

The shipping board, in a commendable effort to stimulate the progressiveness that will lead to greater efficiency and lower cost of operation, set about, some three years ago, a program of converting twelve and then eight, more or less misfit, steam, cargo vessels to modern diesel drive.

That the service operation of all of these vessels has been satisfactory all of the time is not likely but by and large and looking at it with fairness and the sense of an engineer, the promise of good performance has been borne out by actual experience of the operators of these vessels. In any case, every operator will have a chance to learn what the results have been at the meeting of the Society of Naval Architects and Marine Engineers, Nov. 15, when Capt. R. D. Gatewood, recently resigned as manager of maintenance and repair for the United States shipping board and under whose supervision these vessels were converted to diesel drive, reads his paper on "Comparison of Operating Cost of Engine Department of the United States Shipping Board Diesel and Steam Cargo Vessels." Captain Gatewood is in a position to know the worst as well as the best about these large size marine diesel engines built in the United States during the last two or three years. Though it must be borne in mind that the success of any installation depends on many factors and it is not safe to generalize too definitely from any particular instance. Where the economics are in its favor, nothing can stop the increased application of the diesel engine to ship propulsion. Any momentary setback, due to minor failures, will not stop its forward march.

Launchings and Trial Trips of Foreign Diesel Ships During Two Months

The Following Diesel Vessels Were Launched During This Period

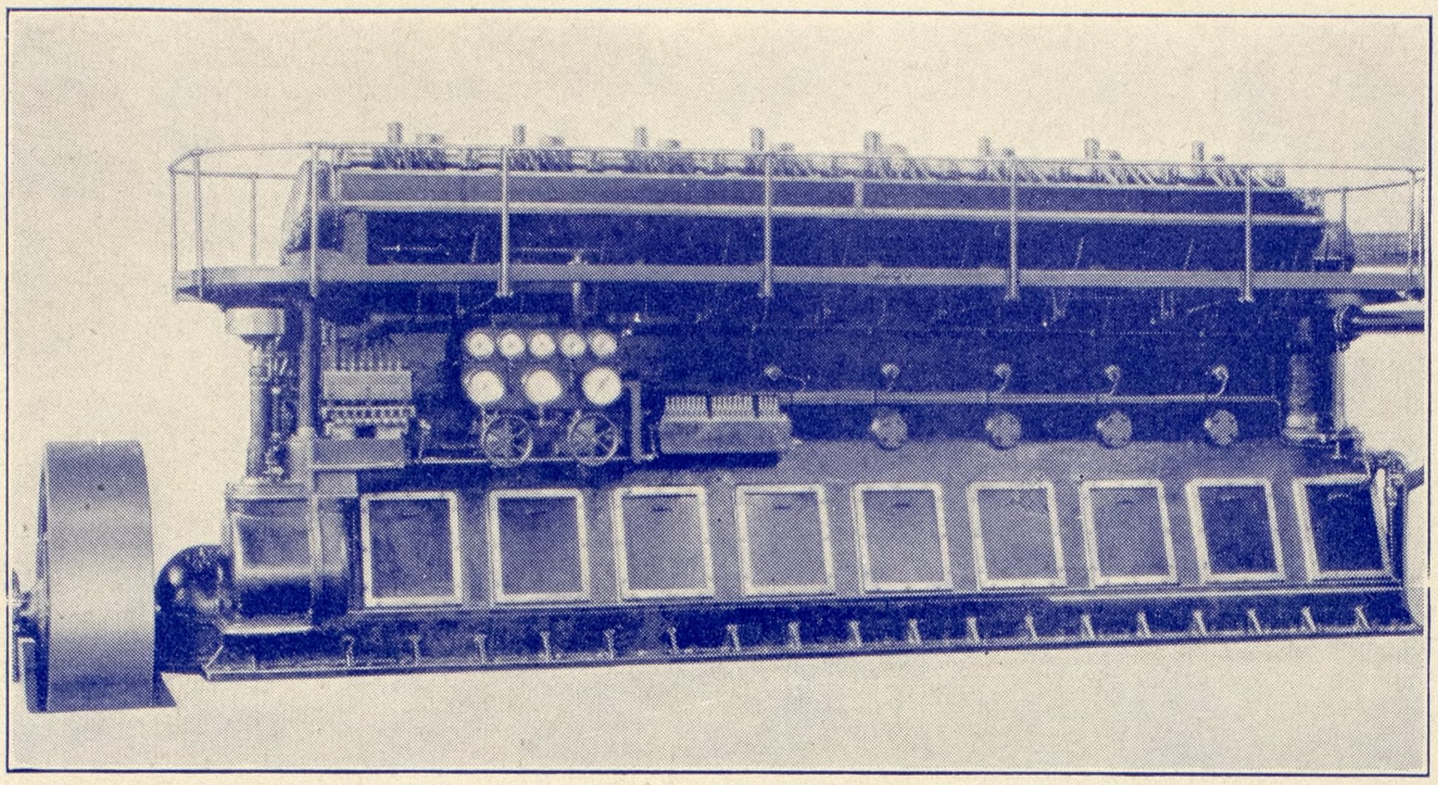
NAME	Nationality Builder — Owner	Type	Number of Propellers	Dimensions L′ x B′ x D′	Tonnage	Speed Knots	Make of Engine	Date 1929
Amerika	Danish — Danish	P. & C.	One	490x....x....	.....	15	B. & W.	Sept. ..
Armadale	British — British	Cargo	One	425x54x38	8,800 d.w.	..	Denny-Sulzer	Aug. 6
Athelsultan	British — British	Tanker	Two	475x63¼x35	13,000 d.w.	..	B. & W.—H. & W.	Aug. 27
Athelviscount	British — British	Tanker	Two	475x63¼x35	9,000 gross	..	H. & W.—B. & W.	July 24
Balaklava	Swedish — Swedish	Tanker	Two	458x35x26	11,000 d.w.	..	B. & W.	Sept. 7
Baldur	German — German	.....	One	410x58x37¾	9,000 d.w.	..	.....	Aug. 20
Baloeran	Dutch — Dutch	P. & C.	One	.....	11,000 d.w.	..	Dutch	Aug. 29
Bonnington Court	British — British	Cargo	One	419x55¼x28¼	9,000 d.w.	..	H. & W.—B. & W.	Aug. 26
Brimanger	British — Norwegian	C. & P.	Two	415x55x36¾	8,500 d.w.	13	B. & W.—H. & W.	Sept. 21
Britannic	British — British	P. & C.	Two	680x82x43¾	26,840 gross	..	H. & W.—B. & W.	Aug. 6
Ciudad de Asuncion	British — Argentine	P. & C.	One	320x58½x27	.....	..	H. & W.—B. & W.	Aug. 22
El Hak	British — British	Cargo	One	241½x35x20¾	.....	..	Atlas Polar	Aug. 23
Hai Hing	Swedish — Swedish	P. & C.	Two	295x45x20	.....	13	Gotaverken—B. & W.	Aug. 10
Hallingdal	Danish — Norwegian	Cargo	One	325x50x23	5,500 d.w.	..	B. & W.	Sept. ..
Hanseat	German — German	Tanker	One	440x64x35¼	11,000 d.w.	12½	Vulcan—M.A.N.	Sept. 11
Hindanger	British — Norwegian	Cargo	Two	415x54½x36¾	8,500 d.w.	..	H. & W.—B. & W.	July 25
Johan van Oldenbarnevelt	Dutch — Dutch	P. & C.	Two	580x74½x47¼	18,000 gross	18	Sulzer Bros.	Aug. 3
Kufra	British — British	Cargo	One	330x47x30	2,650 gross	11¼	H. & W.—B. & W.	Aug. 21
Lagaholm	Swedish — Swedish	Cargo	One	334x46¾x40	5,000 d.w.	..	Eriksberg—B. & W.	Aug. 29
Lion	Dutch — Norwegian	Tanker	Two	465½x60x37	11,000 d.w.	11½	Werkspoor	Aug. 31
Lochshiel	British — British	Cargo	....	111x....x....	.....	..	Gardner	Aug. 8
Menestheus	British — British	P. & C.	Two	452x59x35¼	7,830 gross	..	B. & W.	Aug. 6
Oakland	German — German	Cargo	One	.....	9,000	..	.....	Aug. 1
Oregon	German — French	P. & C.	One	.....	10,000 d.w.	..	.....	Aug. 8
Silverpalm	British — British	C. & P.	Two	468x61¼x39½	9,600 d.w.	..	Doxford	Aug. 6
Spanilac	German — German	.....	One	174x29x16	.....	..	.....	Sept. 4

The Following Diesel Vessels Completed Trials During This Period

NAME	Nationality Builder — Owner	Type	Number of Propellers	Dimensions L′ x B′ x D′	Tonnage	Speed Knots	Make of Engine	Date 1929
Alsia	Danish — Danish	P. & C.	Two	425x57x36	8,100 d.w.	14½	B. & W.	Sept. 7
Anastas Mikojan	German —	Tug	....	181x37½x12¼	800 tons	..	Two 7-cyl. motors	July 23
Athelcrown	British — British	Tanker	Two	546¾x68¾x39	17,000 d.w.	..	B. & W.	Aug. 8
Cressington Court	British — British	Cargo	One	419x55½x37¼	9,200 d.w.	..	Doxford	Aug. 31
Deutschland	German — German	Patrol	One	89x16½x8½	.....	15	M.A.N.	Aug. ..
Geoffrey Stanley	British — British	Cargo	One	90x18x7	.....	7	Plenty-Still	Aug. ..
Manhem	Swedish — Swedish	Cargo	One	292x43x28	3,070 d.w.	13	Eriksberg B. & W.	Sept. 10
Orion	German — American	Yacht	One	305x46½x26½	3,400 displ.	..	German	July 27
Pacific Ranger	Danish — British	P. & C.	Two	435x60x42	10,000 d.w.	13	B. & W.	Sept.4-5
Penrith Castle	British — British	Cargo	Two	460x60x31½	.....	15	Werkspoor	July 30
R. R. 91	German — German	Tender	One	.....	.....	6	Bohn & Kahler	Sept. 7
Shautung	Swedish — Swedish	C. & P.	Two	435x57x31½	10,100 d.w.	..	B. & W.	Aug. 8
Sheaf Holme	British — British	Cargo	One	407x54½x28	8,750 d.w.	14	Doxford	Aug. 8
Sud Expreso	German — Swedish	P. & C.	One	459¾x60¼x42	8,263 d.w.	16	Two 6-cyl.	July 29
Sveadrott	Swedish — Swedish	Cargo	Two	395x54½x37½	8,100 d.w.	12½	Kockum M.A.N.	Aug. 15
Tai Ping Yangy	German — Norwegian	P. & C.	Two	460x60½x29	9,500 d.w.	14	German	Aug. 27
Ternen	German — German	P. & C.	One	.....	.....	9½	Benz	July 23
Ulster Queen	British — British	P. & C.	Two	345x46x19	3,760 gross	..	H. & W.—B. & W.	Sept. 5
Villanger	British — Norwegian	Cargo	One	415x54½x....	8,500 d.w.	..	B. & W.—H. & W.	Aug. 23
Westralia	British — Australian	P. & C.	Two	430½x60x29½	8,108 gross	15½	H. & W.—B. & W.	Aug. 15
Zmaj	German — German	Repair Ship	One	.....	2,000	..	M.A.N.	Sept. 3

Diesel Electric Drive in Freighter Courageous

Four Engines—Each 1280 B. H. P.



Engine

Name—McIntosh & Seymour; **Year**—1929
Builder—McIntosh & Seymour Corp.
Cycle—Four; **No. of Cyls.**—8; **B. H. P.**—1280
Action—Single; **Injection**—Air; **No scavenging**
Piston Cooling—Oil cooling; **Bore**—20 inches
Stroke—24 inches; **R. P. M.**—250
Pist. Spd.—1000 f. p. m.; **B. H. P. per Cyl.**—160
Stroke to Bore—1.2; **Wkg. Strokes per Rev.**—4
Reversing—None; Drives generator

Vessel

Name—Courageous; Triumph; and Defiance
Owner—United States Shipping Board
Converted to Diesel—Federal S. B. & D. D. Co.
Type—Single screw steel, ocean cargo vessel
Main Drive—Four diesel engine generating sets supplying current to one propulsion motor directly connected to the propeller
Length B. P.—457 ft. 4½ in.; **Beam**—56 ft.
Depth—38 feet; **Deadweight**—10,500 tons
Speed—13½ knots; **No. of Propellers**—One

DESCRIPTION

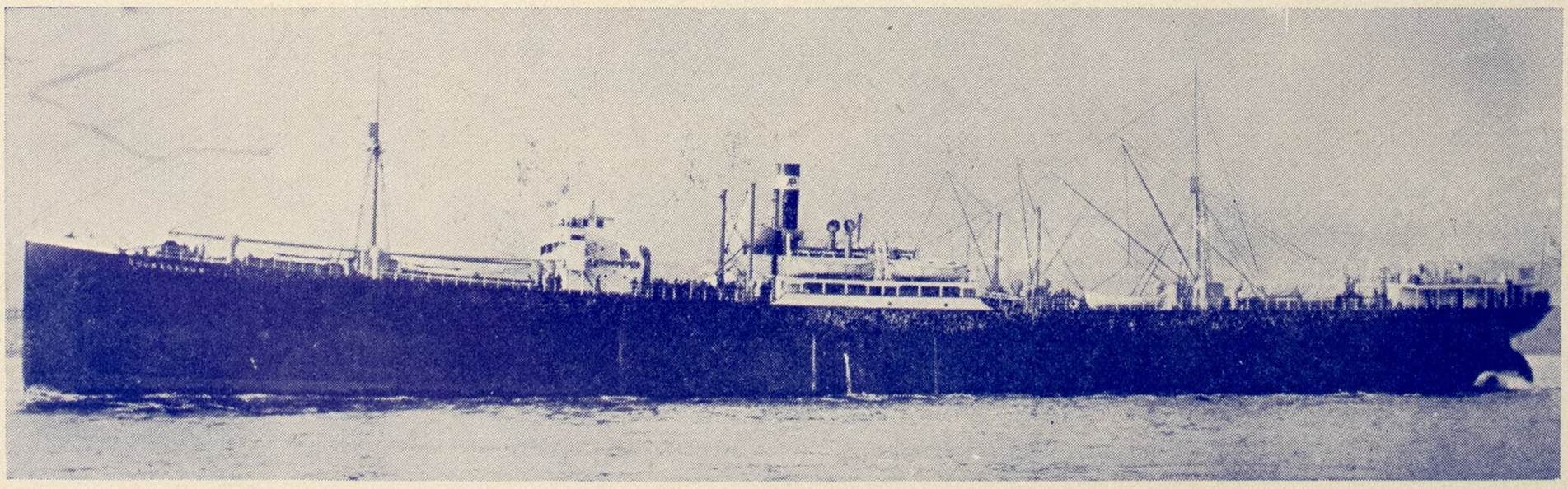
Four engines of this kind direct connected to generators were installed after alterations in the stern hull structure in each of the shipping board freighters COURAGEOUS, TRIUMPH and DEFIANCE. Each engine of 1280 brake horsepower is direct connected to generators of 800 kilowatts capacity each and exciters at 100 kilowatts each.

Remarks

The conversion of the COURAGEOUS was carried out by the Federal Shipbuilding & Dry Dock Co. Work on the DEFIANCE was done at the Norfolk navy yard and that of the TRIUMPH at the Boston navy yard. Electrical equipment of the COURAGEOUS was supplied by the General Electric Co. and for the TRIUMPH and DEFIANCE by the Westinghouse Electric & Mfg. Co.

The overall length of the engines, including the flywheel, is 31 feet 8 inches and the height from the operating grating to the top of the fuel valve is 11 feet 7 inches. Each engine, including flywheel, generator shaft and outboard bearing, weighs 144 pounds per horsepower at normal load.

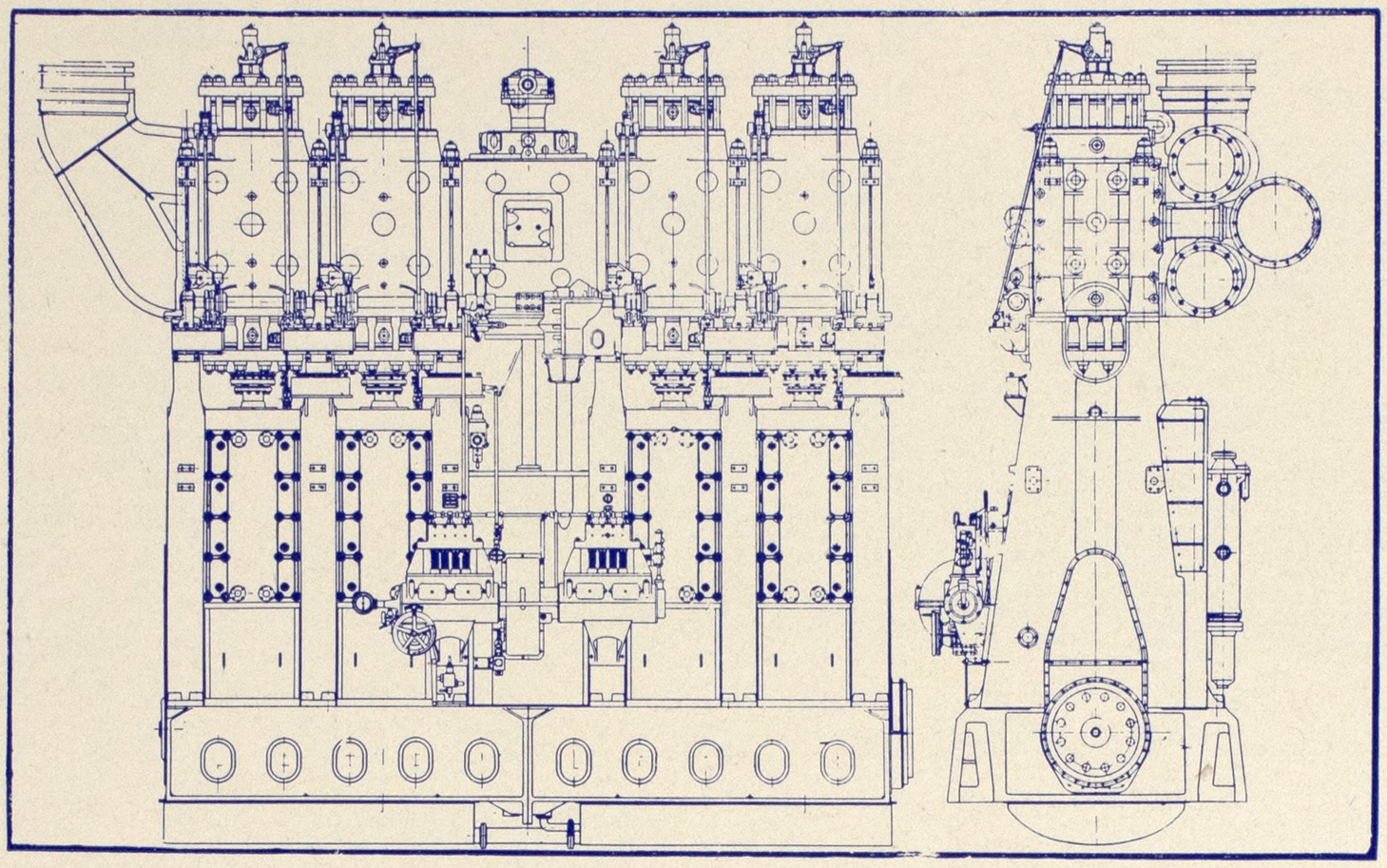
To start up the machinery, when the vessel is cold, it is necessary first to operate a 32-kilowatt diesel engine driven generating set. With the current so generated a motor driven auxiliary compressor is operated until sufficient pressure is built up in the starting tank. This tank is only large enough for safely starting one of the four diesel units and is consequently less than one-fourth of the size necessary if the power were in one large unit.



Single Screw Diesel Electric Freighter COURAGEOUS Fitted With Four McIntosh-Seymour Diesel Engines Driving Generators

Diesel Direct Drive in Freighter Wichita

One Double Acting Engine—4000 B. H. P.



DESCRIPTION

One engine of this size and type direct connected to the propeller shaft has been installed in each of the 9300-ton deadweight shipping board freighters, NEW ORLEANS and WICHITA. This engine is of crosshead construction, has four cylinders and works on the two-stroke cycle with air injection and port scavenging. It is of sufficient power to give the vessel a speed of 13½ knots.

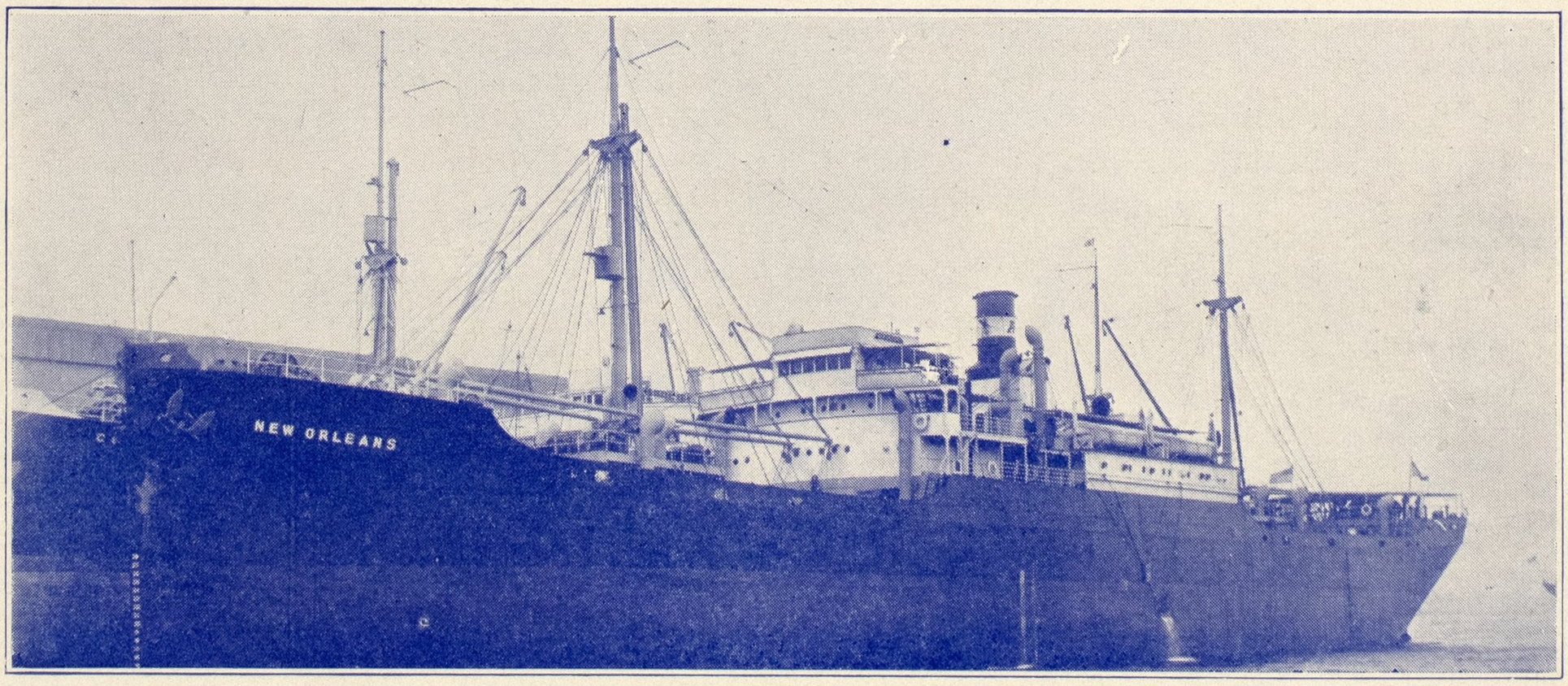
Engine

Name of Engine—Hamilton M. A. N.; 1929
Builder—The Hooven, Owens, Rentschler Co.
Cycle—Two; **No. of Cylinders**—4; **I. H. P.**—5000
B. H. P.—4000; **Action**—Double acting
Injection—Air; **Scavenging**—Port scavenging
Piston Cooling—Fresh water; **Bore**—27½ inches
Stroke—47¼ in.; **Piston Speed**—867 f. p. m.
R. P. M.—110; **Pressure Ind.**—85 pounds
Pressure Brake—69 lb.; **B. H. P. per Cyl.**—1000
I. H. P. per Cyl.—1250; **Mechanical Eff.**—81%
Stroke to Bore—1.718; **Wkg. Strs. Per Rev.**—8
Length O. A.—32 ft. 0 in.; **Height O. A.**—26 ft.
Width O. A.—16 ft. 0 in.; **Weight**—720,000 lb.
Lb. per B. H. P.—180; **Per I. H. P.**—144 lb.
Reversing—By air, with sliding cams
Air Compressor—Three stage, vertical, attached

Vessel

Name—Wichita; **Type**—Ocean freighter
Main Drive—Single screw, direct, D. A. diesel
Length B. P.—395 ft. 6 in.; **Beam**—55 ft.
Depth—34 ft. 11 in.; **Draft**—27 ft. ¼-in.
Displacement—13,000 tons; **D.Wt.**—abt. 9300 tons
Speed—13½ knots; **No. of Propellers**—One
Fuel Cap.—760 tons; **Fuel per Day**—18 tons
Fuel—Pounds per B. H. P. per hour—0.44
Radius Without Refueling—14,000 miles
Generators—Two of 340 kilowatts each direct connected to diesel engines

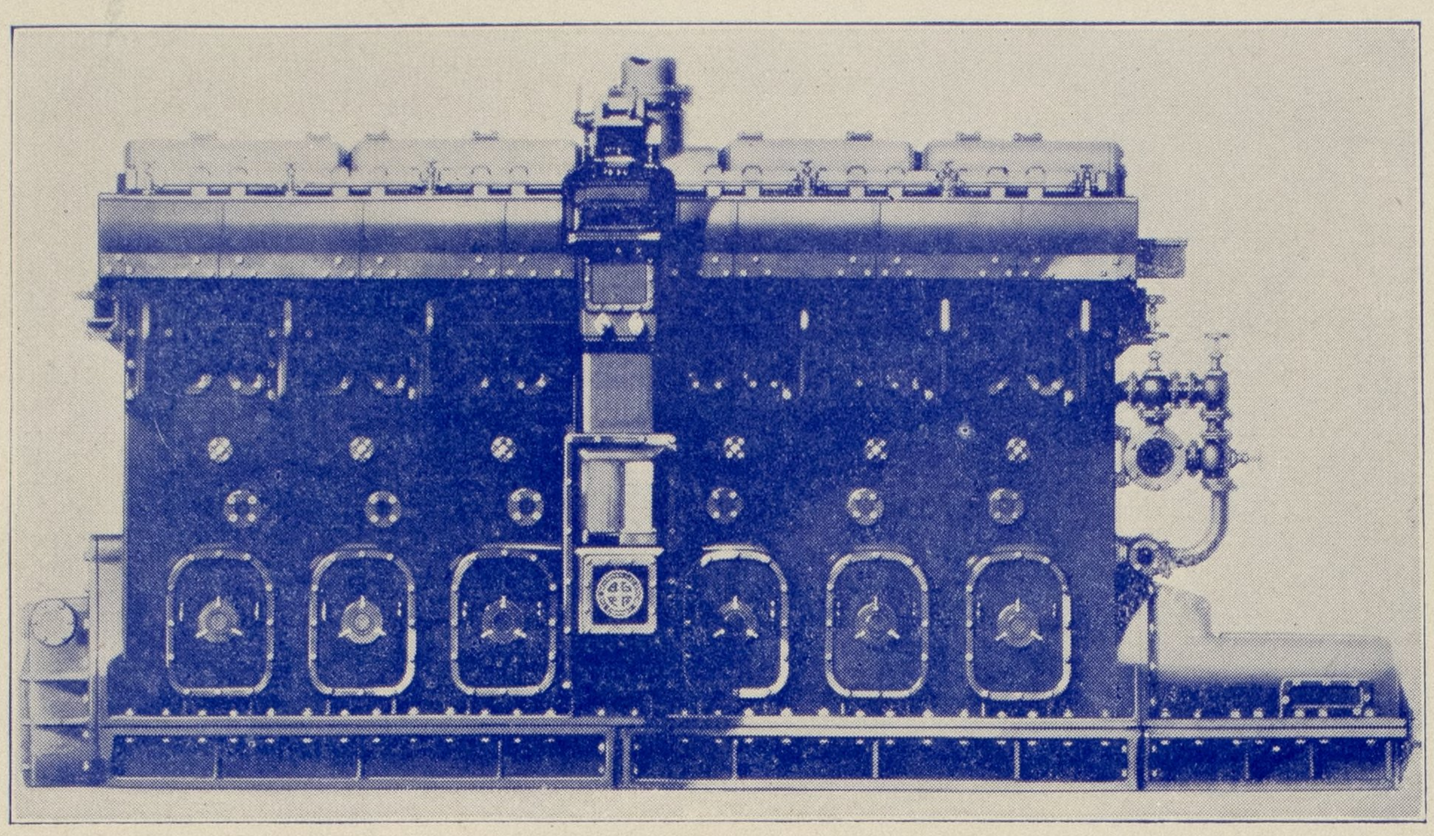
Both the motorships WICHITA and NEW ORLEANS have been in service now for some time under the operation of the Roosevelt Steamship Co. in the Far East trade. On one voyage from New York to Port Said the WICHITA averaged the high speed of 13½ knots.



M. S. NEW ORLEANS Exactly Like M. S. WICHITA—Both Engined with 4000 B. H. P. Diesel Described Above

Diesel Direct Drive in Tanker Blue Sunoco

Two Engines—Each 500 B. H. P.



DESCRIPTION

This tanker has twin screws. An engine such as described and illustrated here is direct connected to each propeller. The engine is of single acting, solid injection, direct reversible type. The crankshaft for both main bearings and pins is ten inches in diameter. The camshaft is built overhead and is driven by a silent chain drive at the center of the shaft.

Engine

Name of Engine—Bessemer Diesel; **Year**—1929
Builder—The Cooper-Bessemer Corp.; **Cycle**—4
No. of Cyls.—6; **B. H. P.**—500; **I. H. P.**—585
Action—Single acting; **Injection**—Mech. Solid
Piston Cooling—Air; **Bore**—14 in.; **Stroke**—18 in.
R. P. M.—275; **Piston Speed**—825 ft. p. m.
Pressure Brake—85; **B. H. P. per Cylinder**—83.3
I. H. P. per Cylinder—97.5; **Mechanical Eff.**—85%
Bore to Stroke—1.28; **Length O. A.**—23 ft. 8 in.
Height O. A.—8 ft. 2 in.; **Width O. A.**—3 ft. 4 in.
Wt. Eng.—75,000; **Reversing**—Direct reversible
Air Comp.—Two 15 H. P. independent, two stage

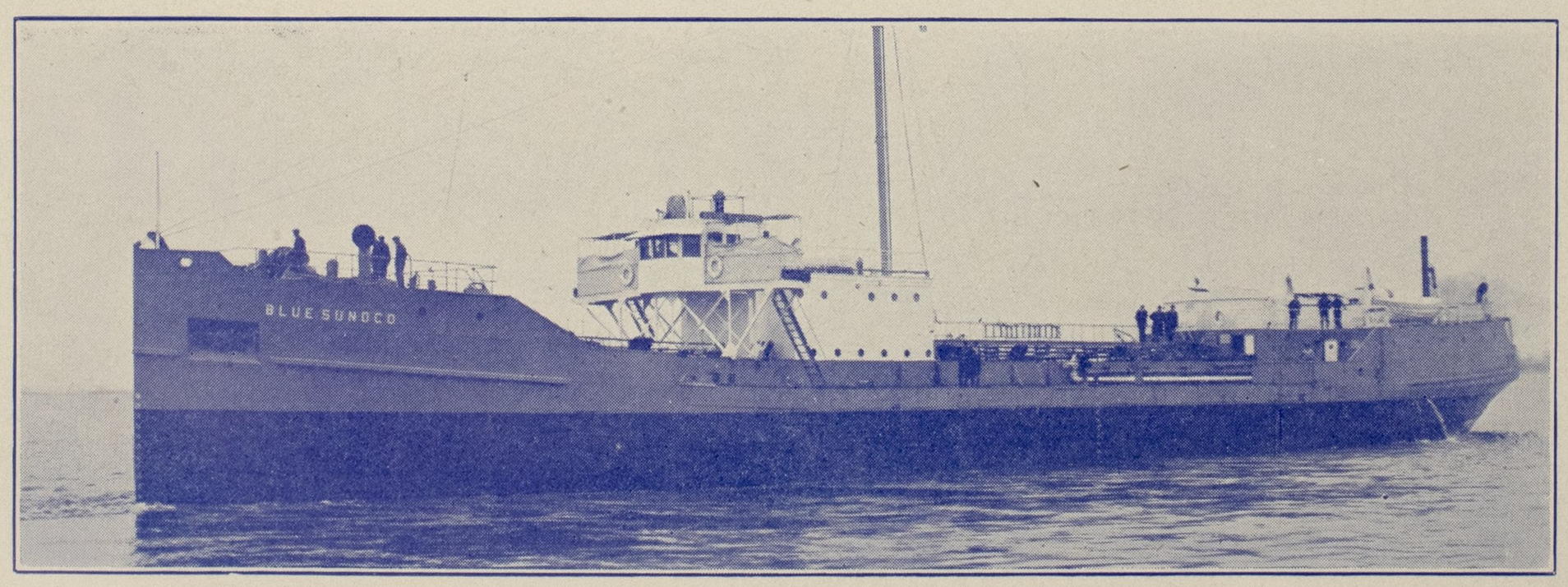
Vessel

Name—Blue Sunoco; **Owner**—Sun Oil Co.
Builder—Sun Shipbuilding & Dry Dock Co.
Type—Twin screw oil tanker; **Completed**—1929
Main Drive—Two diesel engines direct connected
Length B. P.—246 feet 6 inches
Depth—18 ft. 6 in.; **Draft**—15 ft. 6 in.
Deadweight—2350 tons; **Speed**—9½ knots
No. of Propellers—Two; **Cargo Cap.**—20,000 bbls.
Fuel Consumption—Lb. per b. h.p. per hr.—0.44
Generators—Two auxiliary generator sets of 75 kilowatts at 375 revolutions per minute, each driven by Bessemer diesel engines.

Remarks

The BLUE SUNOCO is a steel vessel of single deck type and the hull is constructed on the Isherwood bracketless system. The machinery is located aft and so are the fuel oil tanks and pump room. The dry cargo space is forward. A complete description of this vessel will be found in the July, 1929, issue of MARINE REVIEW.

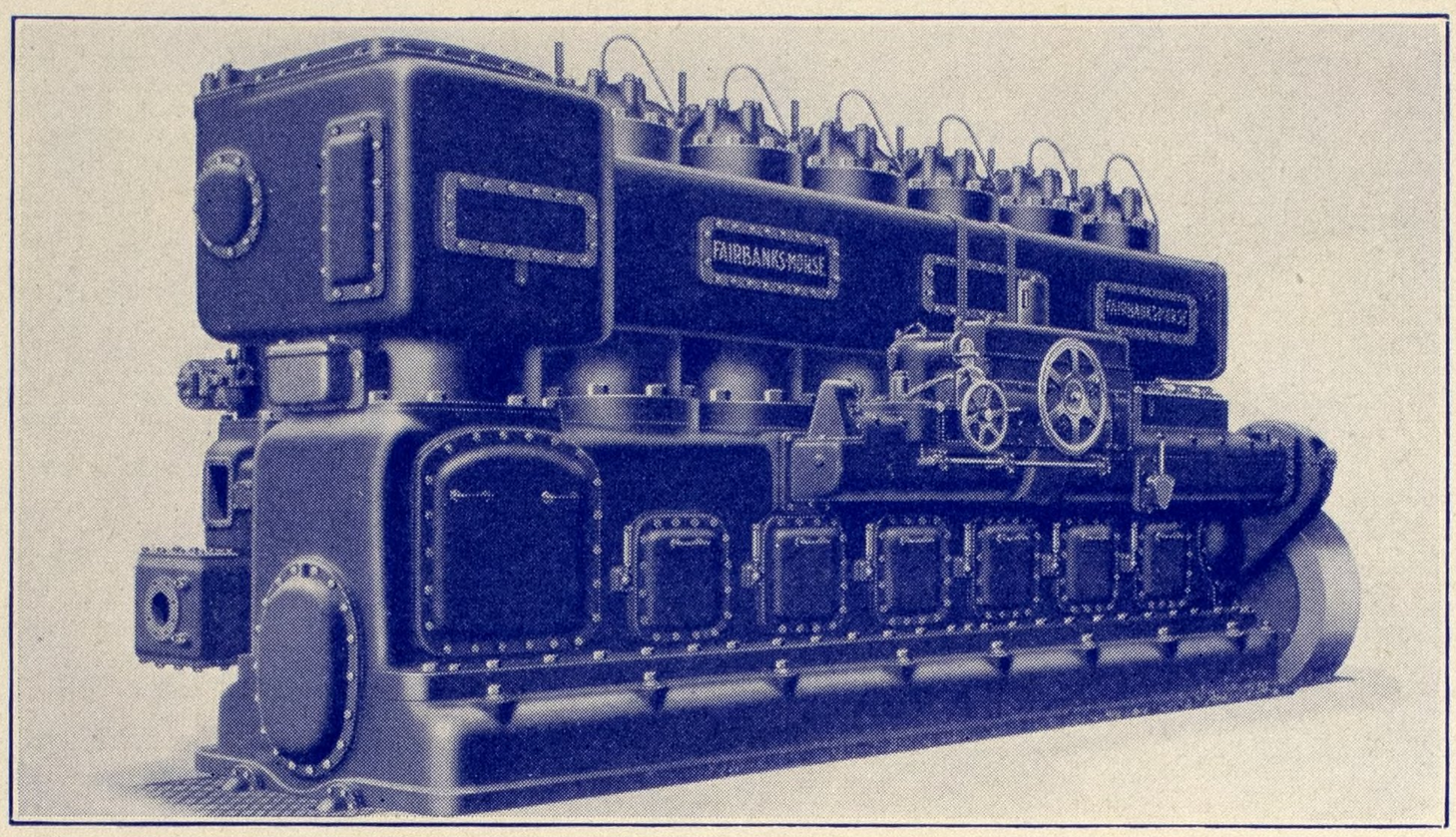
The BLUE SUNOCO is one of a fleet of the Sun Oil Co. engaged in transporting oil and gasoline to inland points and is thoroughly modern in construction and equipment throughout. Both engines may be controlled with one lever, so that one engineer can operate the two in any maneuvers.



Twin Screw Diesel Tanker BLUE SUNOCO—Built by Sun Shipbuilding Co.—Fitted with Two Bessemer Engines.

Diesel Direct Drive in Ferry John M. Dennis

Two Engines—Each 840 B. H. P.



DESCRIPTION

The propelling equipment of the Ferry JOHN M. DENNIS consists of two 2-cycle, airless injection, direct reversible diesel engines with completely built in auxiliaries. Both engines are located on the center line, one forward and one aft, each driving a propeller at either end of the hull. There is in fact no forward or after end as it is a double ended ferry.

Engine

Name of Engine—Fairbanks-Morse; **Year**—1929
Builder—Fairbanks, Morse & Co.; **Cycle**—Two
No. of Cylinders—6; **B. H. P.**—840; **Action**—Single
Injection—Airless; **Scavenging**—Port Scavenging with built in pump
Piston Cooling—Oil; **Bore**—16 in.; **Stroke**—20 in.
R. P. M.—250; **Piston Speed**—835 f. p. m.
Pressure Brake—53; **B. H. P. per Cyl.**—140
Stroke to Bore—1.25; **Wkg. Strokes per Rev.**—6
Lgth. O. A.—24 ft. ⅜ in.; **Hgt. O. A.**—10 ft. 6 in.
Width O. A.—8 ft. 10 in.; **Weight**—109,600 lbs.
Weight—Lbs. per B. H. P.—130
Reversing—Direct; **Air Compressor**—integral

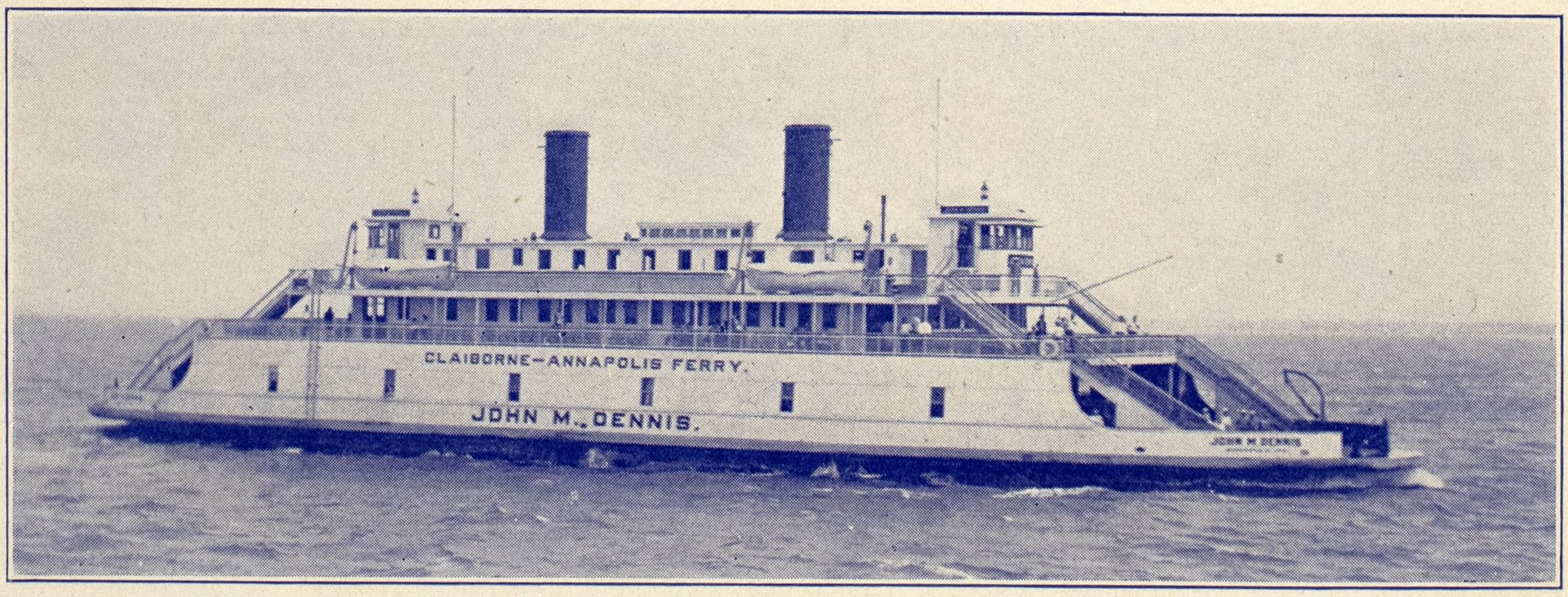
Vessel

Name—John M. Dennis; **Type**—Double ended ferry
Owner—Claiborne-Annapolis Ferry Co.
Builder—Spear Engineers Inc.;
Completed—Delivered June 13, 1929

Main Drive—Diesel, twin screw, direct connected
Length B. P.—179 ft.; **Beam**—60 ft.
Depth—14 ft. 6 in.; **No. of Propellers**—Two
Speed—14½ knots
Fuel Consumption—Lbs. per b. h. p. per hr.—0.46
Generators—Two of 27 and 36 k. w. built by Fairbanks-Morse and driven by Fairbanks, Morse diesel.

Remarks

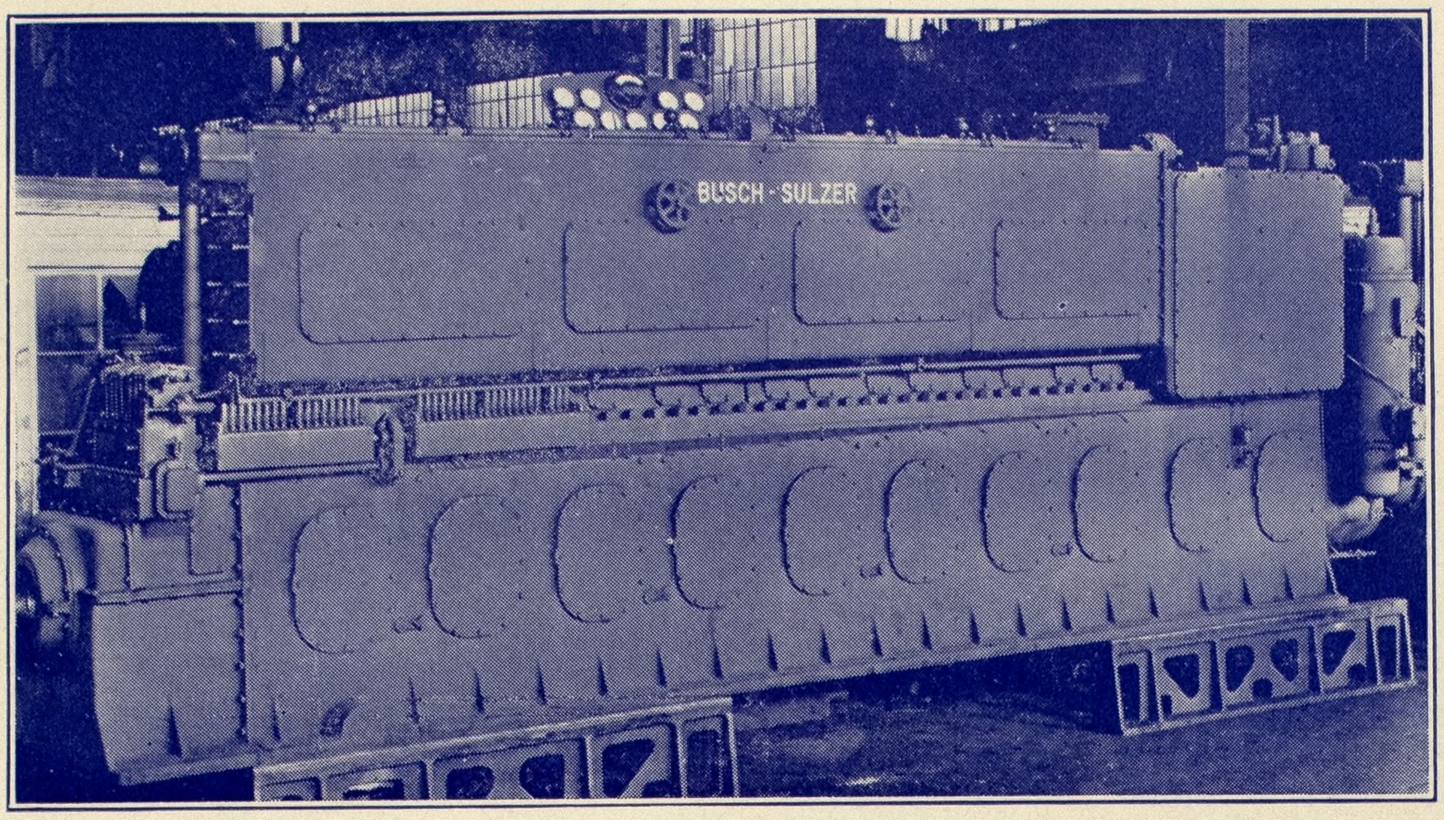
The double ended ferry JOHN M. DENNIS is a recent addition to the fleet now operating between Claiborne and Annapolis on Chesapeake bay. This ferry has a capacity of 100 automobiles and 1500 passengers. She is designed for all year 'round operation as her draft is deep and her propellers are set low to keep free of floating ice. She serves as a companion ship to the ferry GOVERNOR ALBERT C. RITCHIE, powered with four 360-horsepower Fairbanks-Morse diesel engines.



Double Ended Diesel Ferry JOHN M. DENNIS—Built by Spear Engineers Inc.—Fitted with Fairbanks, Morse Diesels

Diesel Electric Drive in Dipper Dredge Mogul

One Engine—1100 B. H. P.



DESCRIPTION

This engine which drives three generators and an exciter at 300 revolutions per minute is of the two-cycle, trunk piston type developed especially for use where a heavy duty unit must be fitted in a minimum space. Forced feed lubrication is used for all important bearings. Scavenging is accomplished by the Sulzer double port system.

Engine

Name of Engine—Busch-Sulzer; **Year**—1929
Builder—Busch-Sulzer Bros. Diesel Engine Co.
Cycle—2; **No. of Cylinders**—8; **B. H. P.**—1100
Action—Single acting; **Injection**—Air injection
Piston Coolg.—Oil; **Bore**—14¾ in.; **Stroke**—18 in.
R. P. M.—300; **Piston Speed**—900 feet per min.
B. H. P.—per Cyl.—137.5; **Stroke to Bore**—1.22
Working Strokes per Revolution—Eight
Weight—One engine, 108,000 lbs.; 98 lbs. per h. p.
Reversing—Engine non-reversing; electric drive
Air Compressor—Integral; Three Stage

Vessel

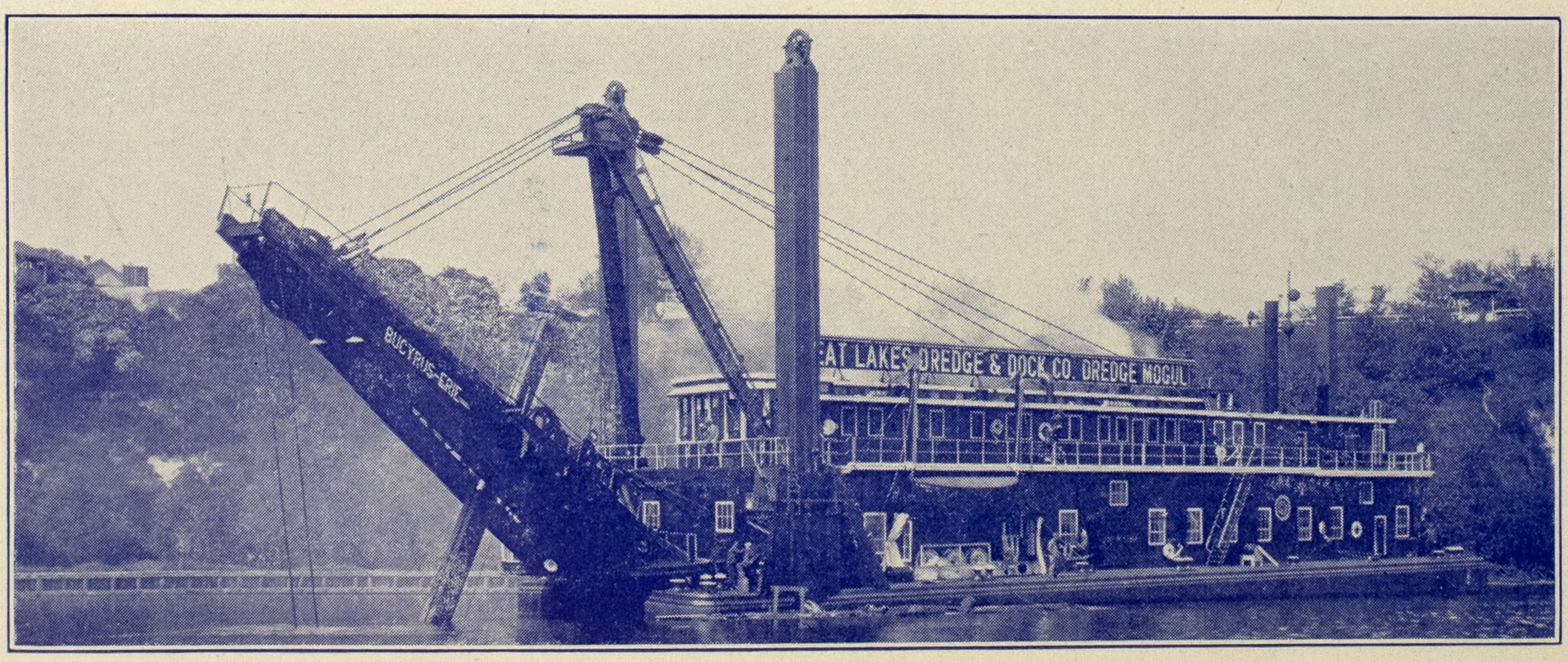
Name—Mogul; diesel electric machinery
Type—Dipper dredge; harbor and channels
Owner—Great Lakes Dredge & Dock Co.
Builder—Manitowoc Shipbuilding Corp.
Drive—Not self propelled; diesel generating set
Length of Hull—156 ft.; **Beam**—42 ft. 6 in.
Depth—12 ft. 8 in.; **Draft**—9 ft. 6 in.
Displacement—At this draft—1950 tons.
Oil Bunker Capacity—88,000 gallons
Dredge Completed—On June 6, 1929
Fuel Consumption—Lbs. per b. h. p. per hr.—0.45

Remarks

The dipper dredge MOGUL has a capacity of eight yards. The hull is of steel and so are the lower deck houses. Three generators and an exciter of General Electric manufacture are direct driven at 300 revolutions per minute by the main diesel engine described here. Power from these generators is used to drive all of the dredging machinery.

Some of the Standard Sizes of Engines Built

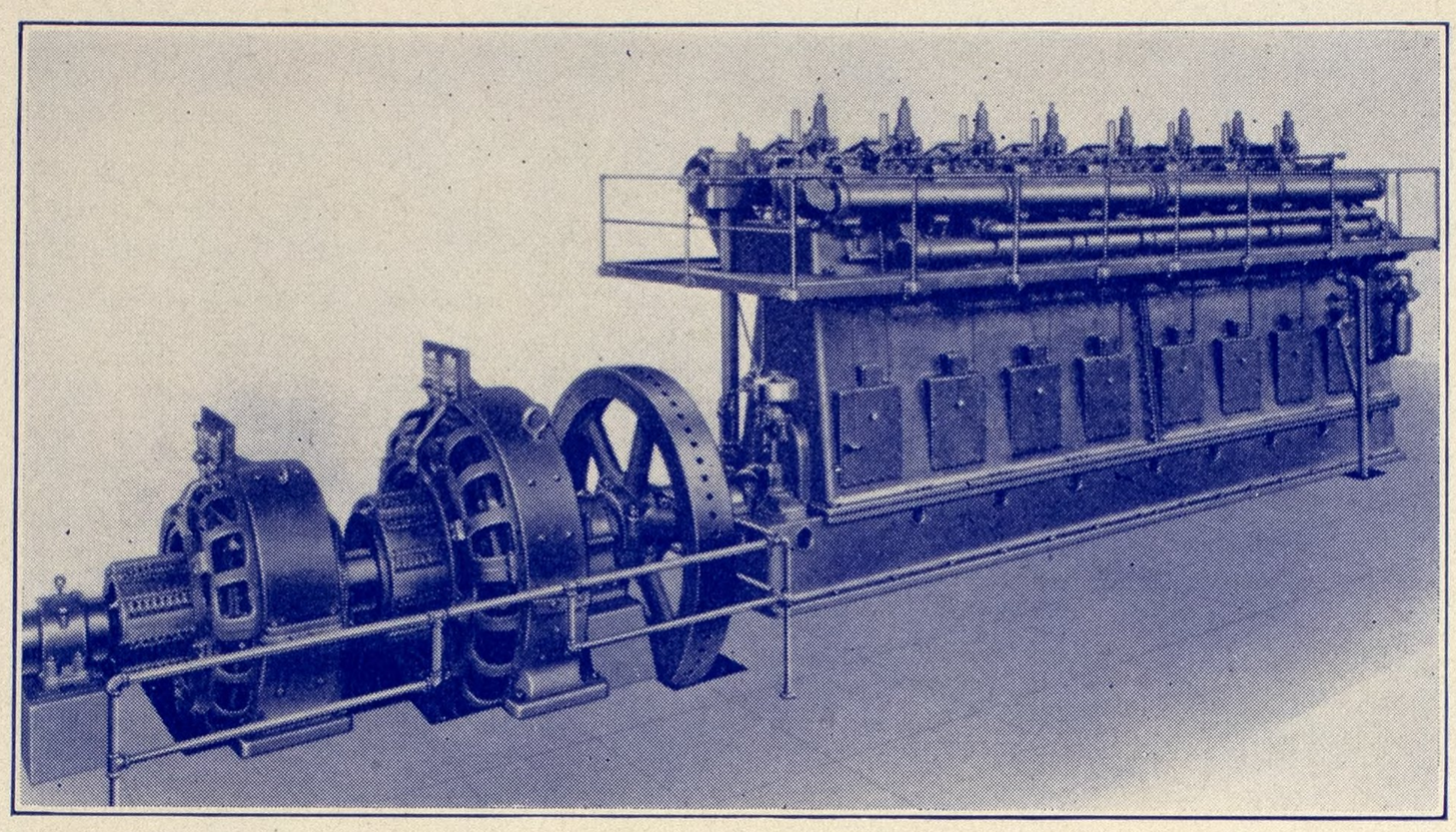
Four cycle engines are built in sizes up to 600 brake horsepower. Two cycle trunk piston engines are built in sizes up to 1500 brake horsepower. Two cycle crosshead type of slow speed are built in sizes up to 7000 brake horsepower. All sizes are made reversing or non-reversing except the smaller four cycle engines which are non-reversing.



Diesel Electric Dipper Dredge MOGUL Built at Manitowoc, W is—Fitted with one 1100-Horsepower Busch-Sulzer Engine

Diesel Electric Hydraulic Dredge Las Cruces

Four Engines—Each 911 B. H. P.



Engine

Name of Engine—Fulton-Diesel; **Year**—1928
Builder—Fulton Iron Works Co.; **Cycle**—4
No. of Cyls.—8; **B. H. P.**—911; **Action**—Single
Injection—Air; **Bore**—17½ in.; **Stroke**—24½ in.
R. P. M.—204; **Piston Speed**—833 feet per min.
Pressure Brake—73.9; **B. H. P. Per Cyl.**—113.9
I. H. P. per Cyl.—161.5; **Mechanical Eff.**—70.5%
Stroke to Bore—1.4; **Wgt.**—1 Eng.—195,000 lbs.
Weight Lbs. per B. H. P.—212; **Reversing**—No
Air Compressors—Integral—Three Stage

Vessel

Name—Las Cruces; **Type**—Hydraulic dredge
Owner—United States (Army Engineers)
Builder—Ellicott Machine Corp.; **April** 1929
Main Drive—Diesel electric; **Lgth. B. P.**—226 ft.
Beam—50 ft.; **Depth**—14 ft.; **Displ.**—2500 Tons
Period Without Refueling—30 days

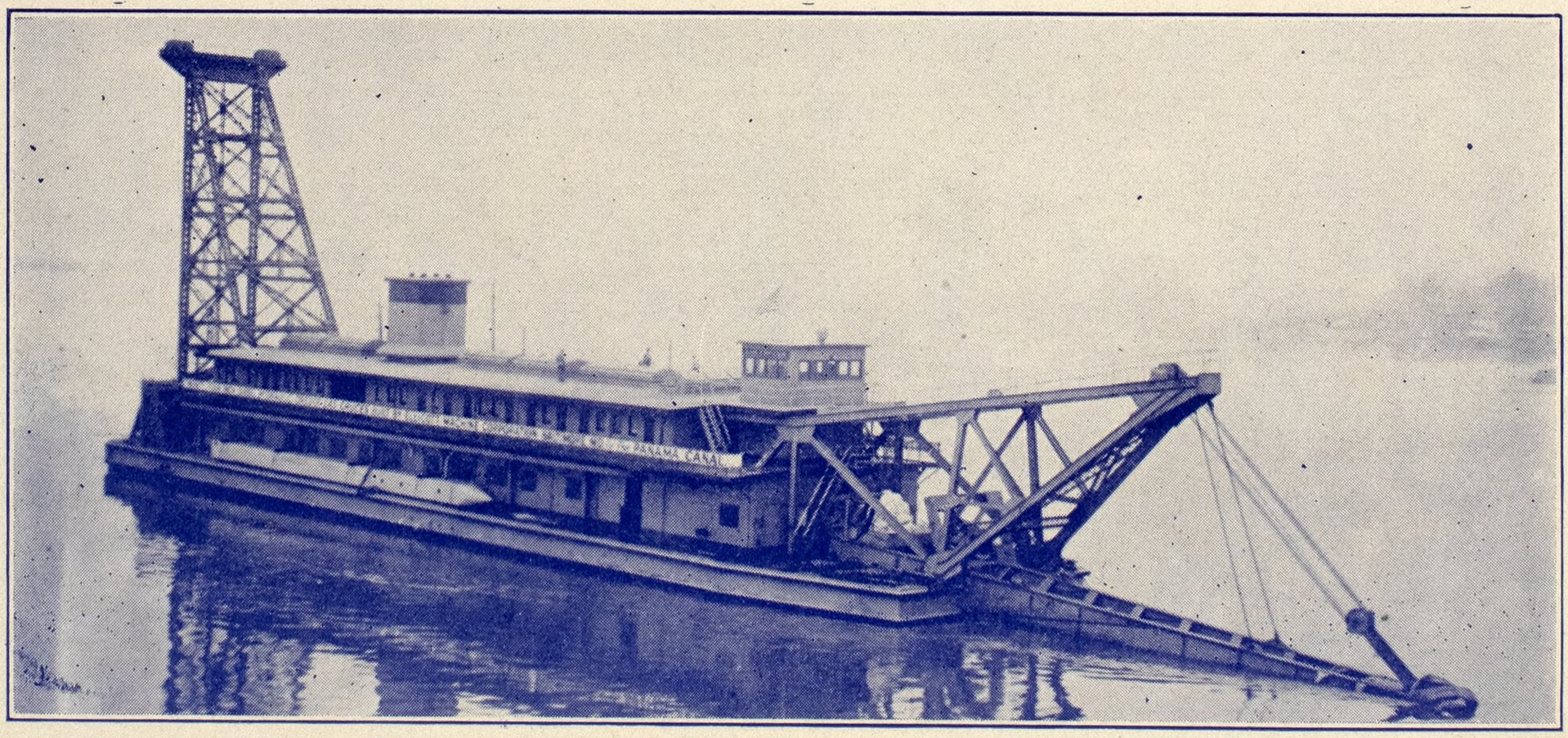
DESCRIPTION

The powerful steel hull hydraulic dredge LAS CRUCES, now in operation at the Panama canal by the United States government is equipped with four 911 brake horsepower eight-cylinder diesel engines each driving one main and one auxiliary direct current generators with both armatures, mounted on a common sub-base. The engines are four cycle, air injection.

Remarks

The LAS CRUCES, built for maintenance of the Panama canal is probably the most powerful hydraulic dredge ever constructed. The four diesel engines described are each direct connected to 550-kilowatt, at 204 revolutions per minute, Westinghouse generators. The motors for driving the pumps and cutters are also of Westinghouse make. This dredge is capable of excavating 2200 cubic feet per minute and of dredging in one swing a cut 250 feet wide at the full depth of dredging which is 60 feet.

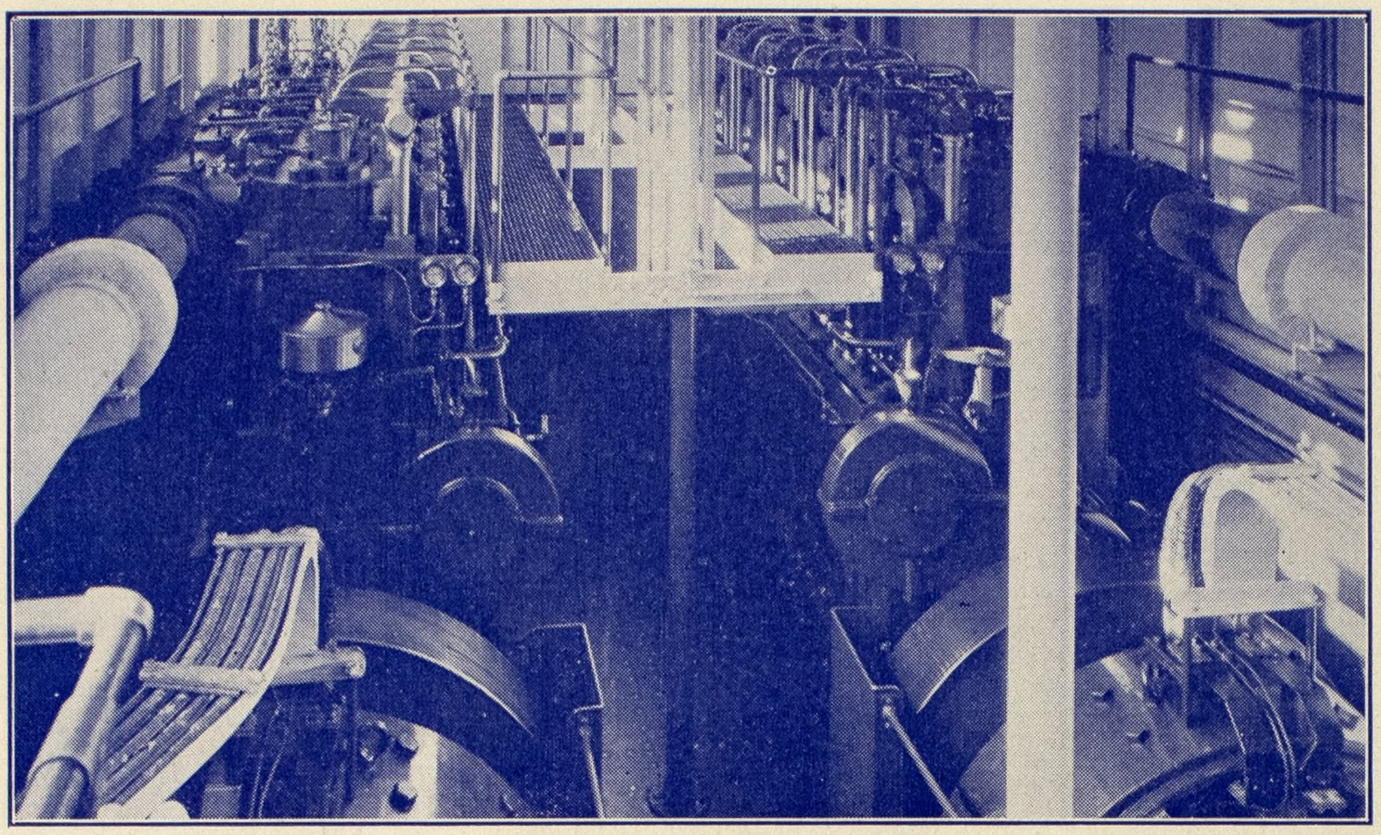
The main dredging pump is of 24-inch size and is located in the pump room in the forward end of the hull.



Diesel Electric Dredge LAS CRUCES Used on the Panama Canal for Hydraulic Dredging

Diesel Electric Drive in River Towboat Warrior

Two Engines—Each 550 B. H. P.



DESCRIPTION

Two of these diesel engines each connected to a generator supplies the current used in two motors each directly connected to a propeller working in a tunnel stern. The engines are of the four cycle solid injection type and have six cylinders. The full power of 550 brake horsepower is developed at 250 revolutions per minute.

Engine

Name of Engine—Nelseco 6-MI-22; **Year**—1928
Builder—Electric Boat Co. N. L. S. & E. Works
Cycle—4; **No. of Cylinders**—6; **I. H. P.**—690
B. H. P.—550; **Action**—Single; **Injection**—Solid
Piston Cooling—No; **Bore**—15 in.; **Stroke**—22 in.
R. P. M.—250; **Piston Speed**—916 feet per minute
Pressure Indicated—94; **Pressure Brake**—75
B. H. P. per Cyl.—92; **I. H. P. per Cyl.**—115
Mechanical Efficiency—80%; **Stroke to Bore**—1.47
Wkg. Strokes per Rev.—1 stroke per 2 revolutions
Lgth. O. A.—18 ft. 2 in.; **Width O. A.**—4 ft. 8 in.
Height Overall—8 ft. 4½ in. above C. L. of shaft
Weight—One engine, 75,150 lbs. incl. flywheel
Weight—Lbs. per B. H. P.—136; **Per I. H. P.**—109
Reversing—Direct reversible; **Air Comp.**—None

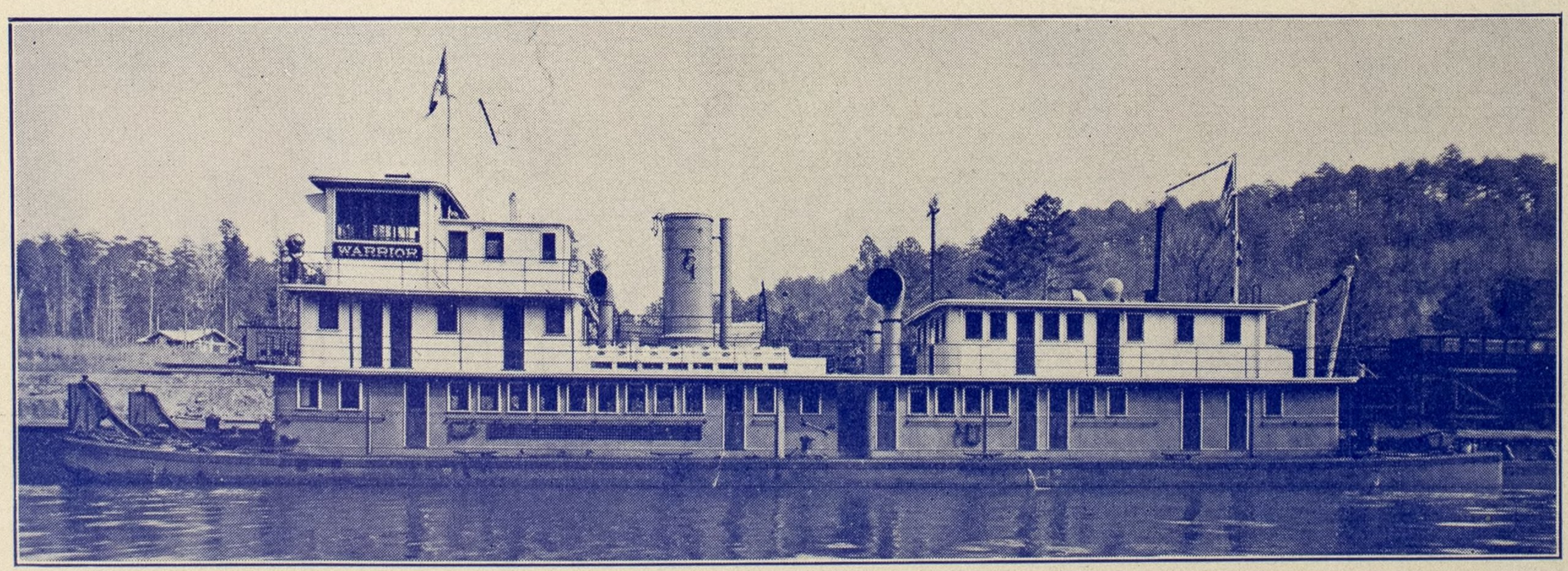
Vessel

Name—Warrior; **Type**—River Towboat
Builder—American Bridge & Carnegie Steel Co.
Completed—Jan. '29; **Drive**—Diesel Electric
Length B. P.—140 feet; **Beam**—25 feet
Depth—9 ft. 3 in.; **Draft**—7 ft.; **Displ.**—575 tons
Speed—with 7 barges—5¼ miles; **Propellers**—Two
Fuel Consumption—Lbs. per b. h. p. per hour—0.40

Remarks

Each engine is direct connected to one 335 kilowatt at 250 revolutions per minute generator. Current is supplied to two double armature 400 shaft horsepower each electric motors direct connected to propellers. The Ward-Leonard system of control is used and the vessel can be operated either from the pilot house or the engine room. All electrical equipment is of General Electric make. This boat is of the twin screw, tunnel stern, shallow draft type and is used on the Warrior river between Mobile and Birmingham, Ala., a distance of 492 miles, for towing freight barges.

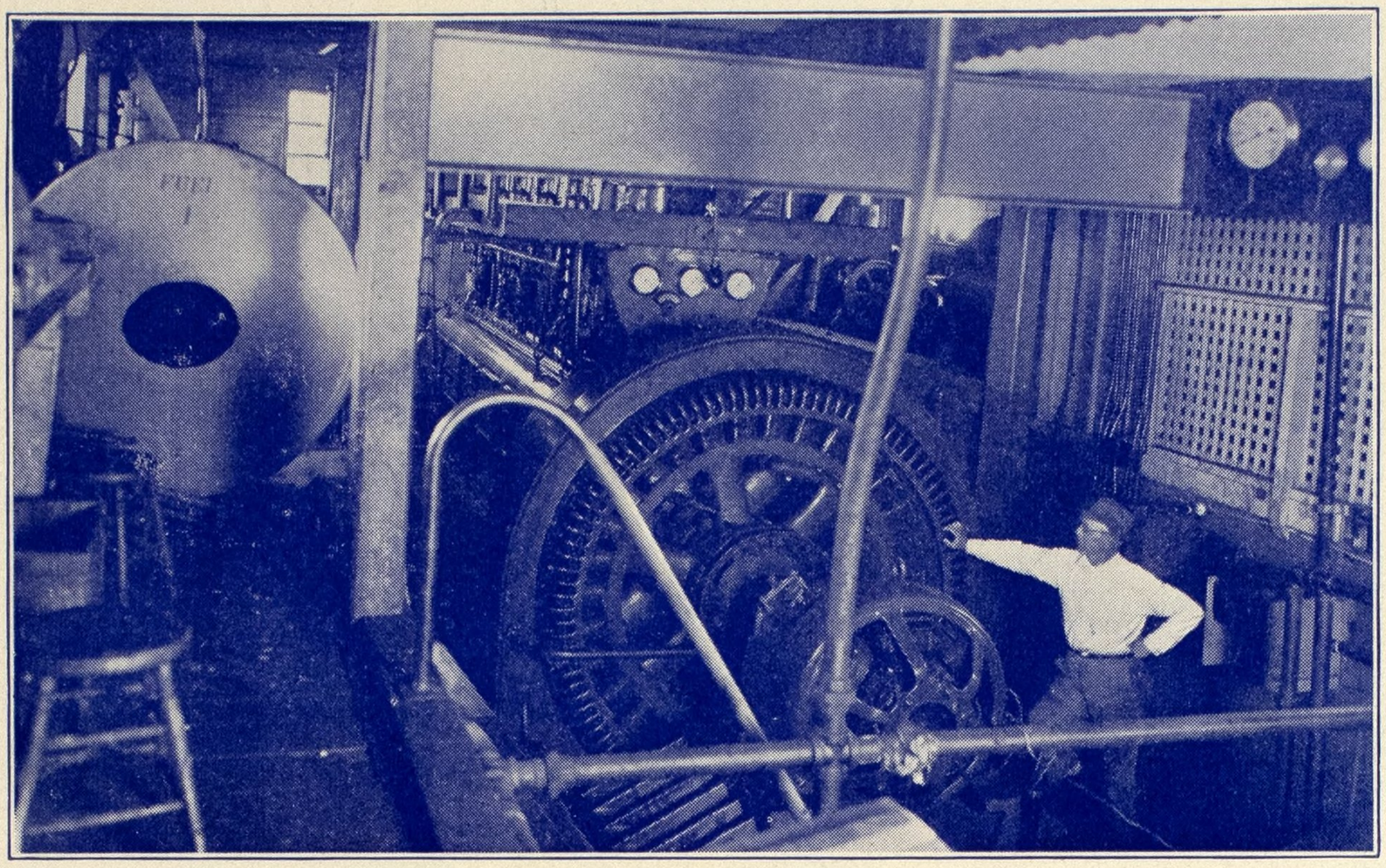
The river for a considerable part of the distance is very winding. Seven barges can be handled in one tow lashed together in front of the boat. A channel depth of 8 feet is maintained by locks.



Twin Screw Tunnel Stern Diesel Electric River Towboat WARRIOR Operates between Mobile and Birmingham, Ala.

Diesel Electric Drive in Dredge Calkins No. 5

One Engine—600 B. H. P.



DESCRIPTION

The power plant of this dredge is a diesel engine of 600 horsepower direct connected to a 400-kilowatt generator operating at 240 revolutions per minute. The engine is of the four-cycle, single acting, solid injection, trunk piston type. It is a nonreversible marine oil engine. No compressed air is required except for starting in first turning over the engine.

Engine

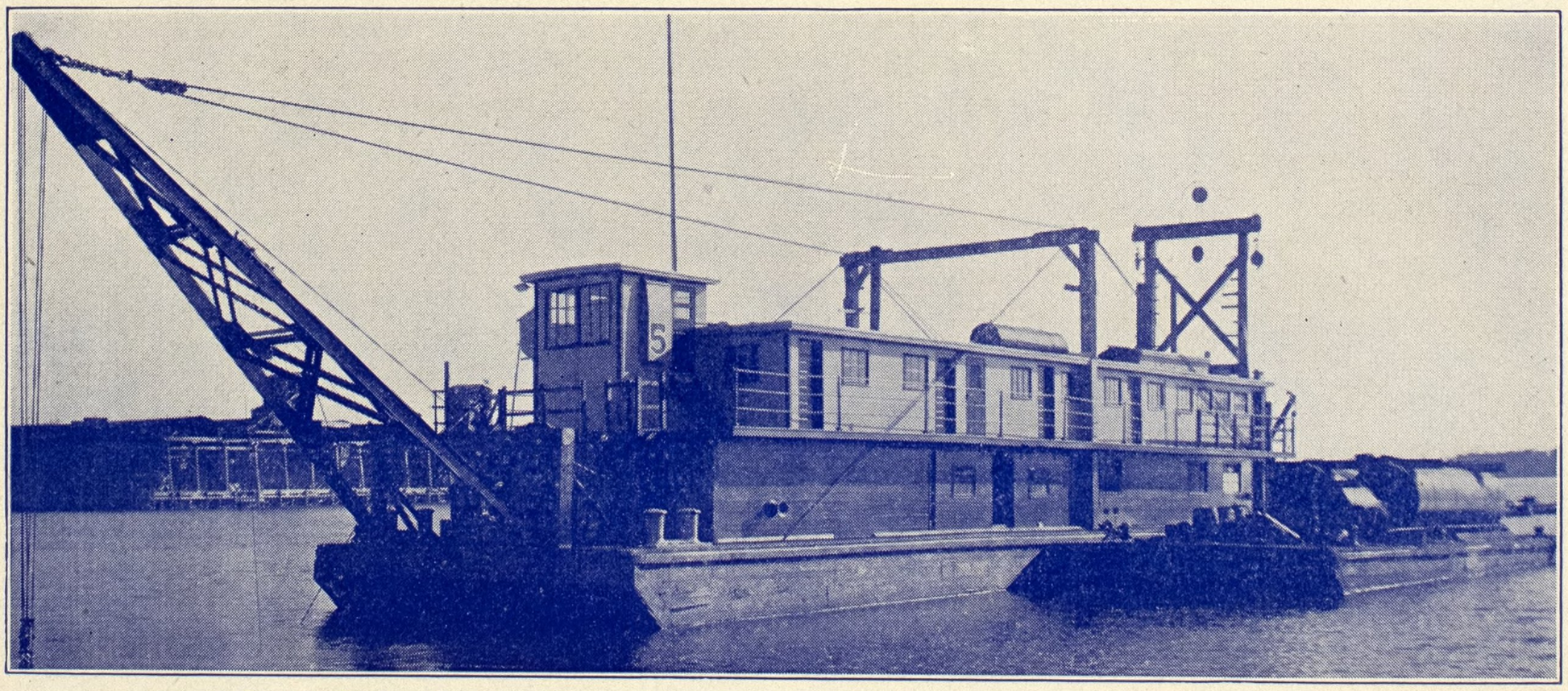
Name of Engine—Ingersoll-Rand; **Year**—1929
Builder—Ingersoll-Rand Co.; **Type**—PR
Cycle—4; **No. of Cylinders**—5; **B. H. P.**—600
Action—Single acting; **Injection**—Solid direct
Scavenging—None; **Piston Cooling**—None
Bore—17¾ in.; **Stroke**—22 in.; **R. P. M.**—240
Piston Speed—880 ft. per min.; **Press. Ind.**—87.6
Pressure Brake—72.7; **B. H. P. per Cyl.**—120
I. H. P. per Cyl.—144.5; **Mech. Efficiency**—83%
Stroke Bore—1.24; **Wkg. Stkes. per Rev.**—2.5
Lgth. O. A.—19 ft.; **Hgth. O. A.**—12 ft. 3½ in.
Width O. A.—7 ft. 3 in.; **Wght. Eng.**—121,000 lbs.
Wt.—Lbs. per B. H. P.—200; **Lbs. per I. H. P.**—166
Reversing—Engine non-reversing; electric drive
Air Compressors—For starting; auxiliaries only

Vessel

Name—Calkins No. 5; diesel electric power
Owner—J. D. Calkins; **Type of Ship**—Dredge
Completed—New diesel electric drive, 1929
Length B. P.—100 ft.; **Beam**—30 ft.
Depth—8½ feet; **Draft**—4½ feet
Fuel Consumption—Lbs. per b. h. p. per hour—0.41

Remarks

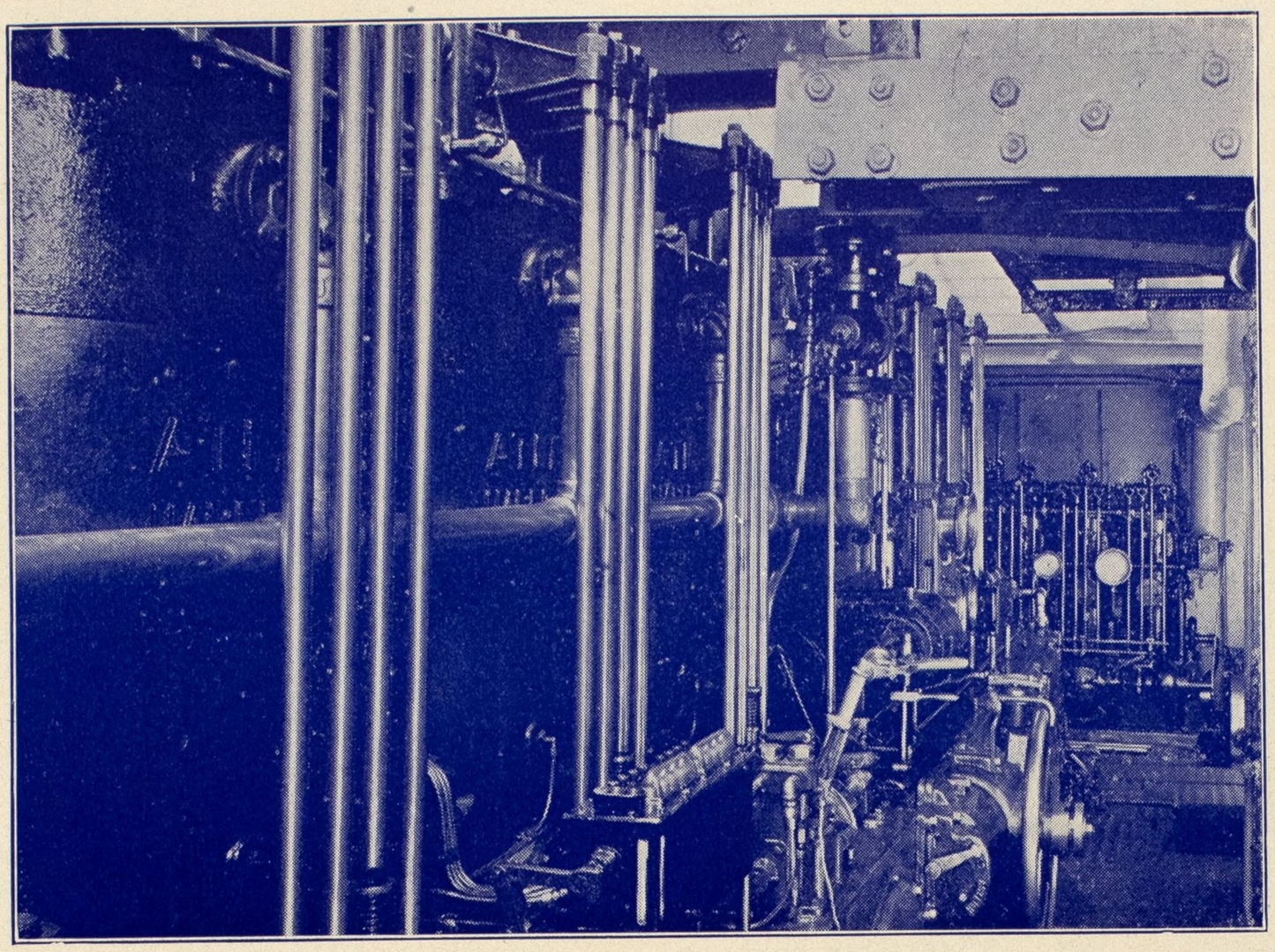
The engine described here is fitted in the Calkins dredge No. 5 and is direct connected to a General Electric generator three phase 60-cycle, 400 kilowatts alternating current at 240 revolutions per minute. There is also one 125 volt, 15-kilowatt exciter direct connected. This dredge is constructed of wood and was originally built in 1925 as a 15-inch suction dredge.



Diesel Electric Dredge CALKINS No. 5—Diesel Generating Set for Electric Power for All Machinery

Diesel Direct Drive in Ocean Tug Chilkat

One Engine—500 B. H. P.



DESCRIPTION

One engine as shown in this view is installed direct connected to a single propeller in the seagoing tug CHILKAT. Three levers serve for operation of the engine, one for the control of rotating starting and stopping, one for control of engine speed and one for fuel pressure control. Cylinders are lubricated from individual mechanical forced feed oiler. An automatic flywheel brake operated from the starting lever insures quick action in manuevering.

Engine

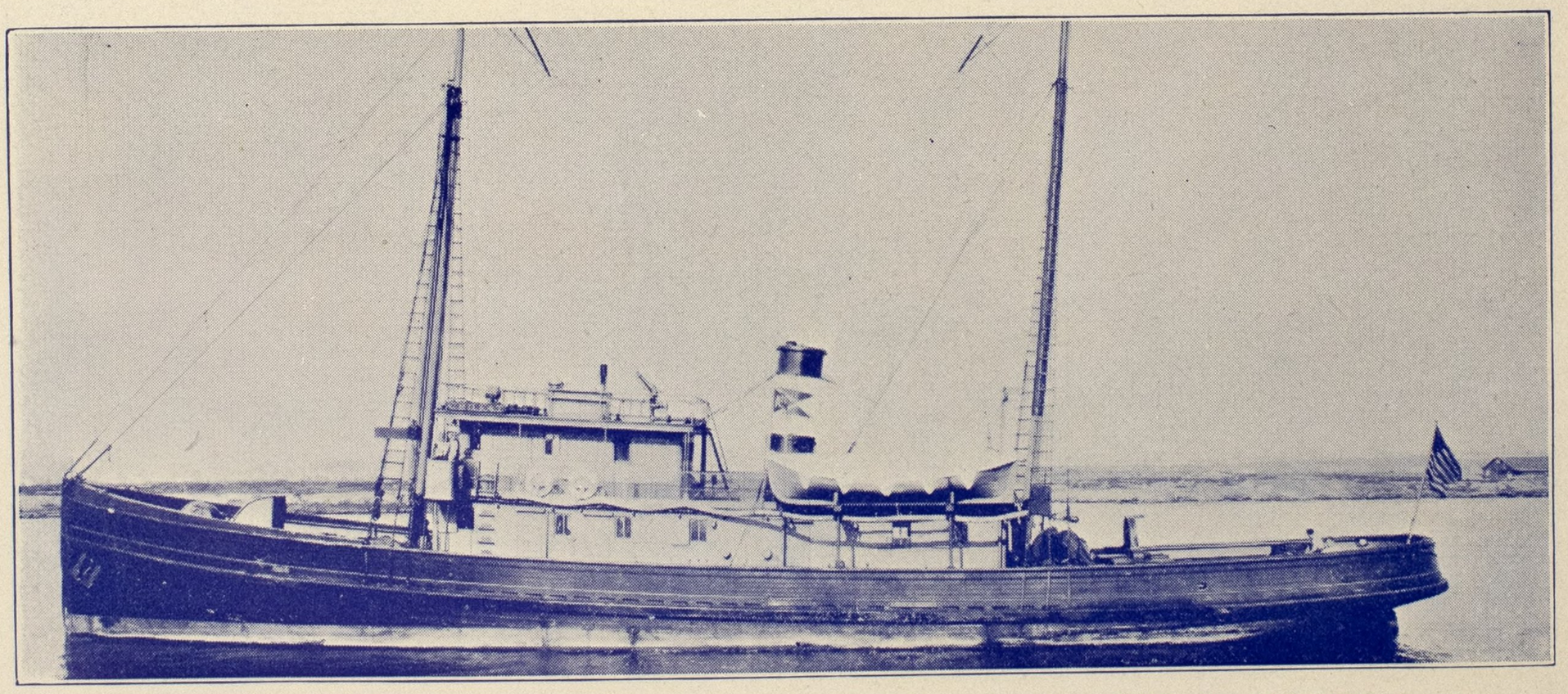
Name of Engine—Atlas-Imperial; **Year**—1929
Builder—Atlas Imperial Diesel Engine Co.
Cycle—4; **No. of Cylinders**—8; **B. H. P.**—500
I. H. P.—680; **Action**—Single; **Injection**—Solid
Piston Cooling—Air; **Bore**—13 in.; **Stroke**—16 in.
R. P. M.—275; **Piston Speed**—733 feet per min.
Pressure Indicated—117; **Pressure Brake**—84
B. H. P. per Cyl.—62½; **I. H. P. per Cyl.**—85
Mechanical Eff.—76½% **Stroke to Bore**—1.23
Length O. A.—28 feet; **Height O. A.**—8 ft. 7 in.
Width Overall—5 feet; **Weight**—75,900 pounds
Reversing—Directly reversible
Air Compressors—Maneuvering compressors only

Vessel

Name—Chilkat; **Type**—Ocean going towboat
Owner—Alaska Packers Association
Main Drive—Single screw direct connected diesel
Length B. P.—115 ft. 6 in.; **Beam**—24 feet
Depth—10 ft. 6 in.; **Gross**—172; **Net**—98
Speed—12 knots; **No. of Propellers**—One
Fuel Capacity—2091 barrels
Fuel Consumption—Lbs. per b. h. p. per hour—.41
Radius Without Refueling—9800 miles

Remarks

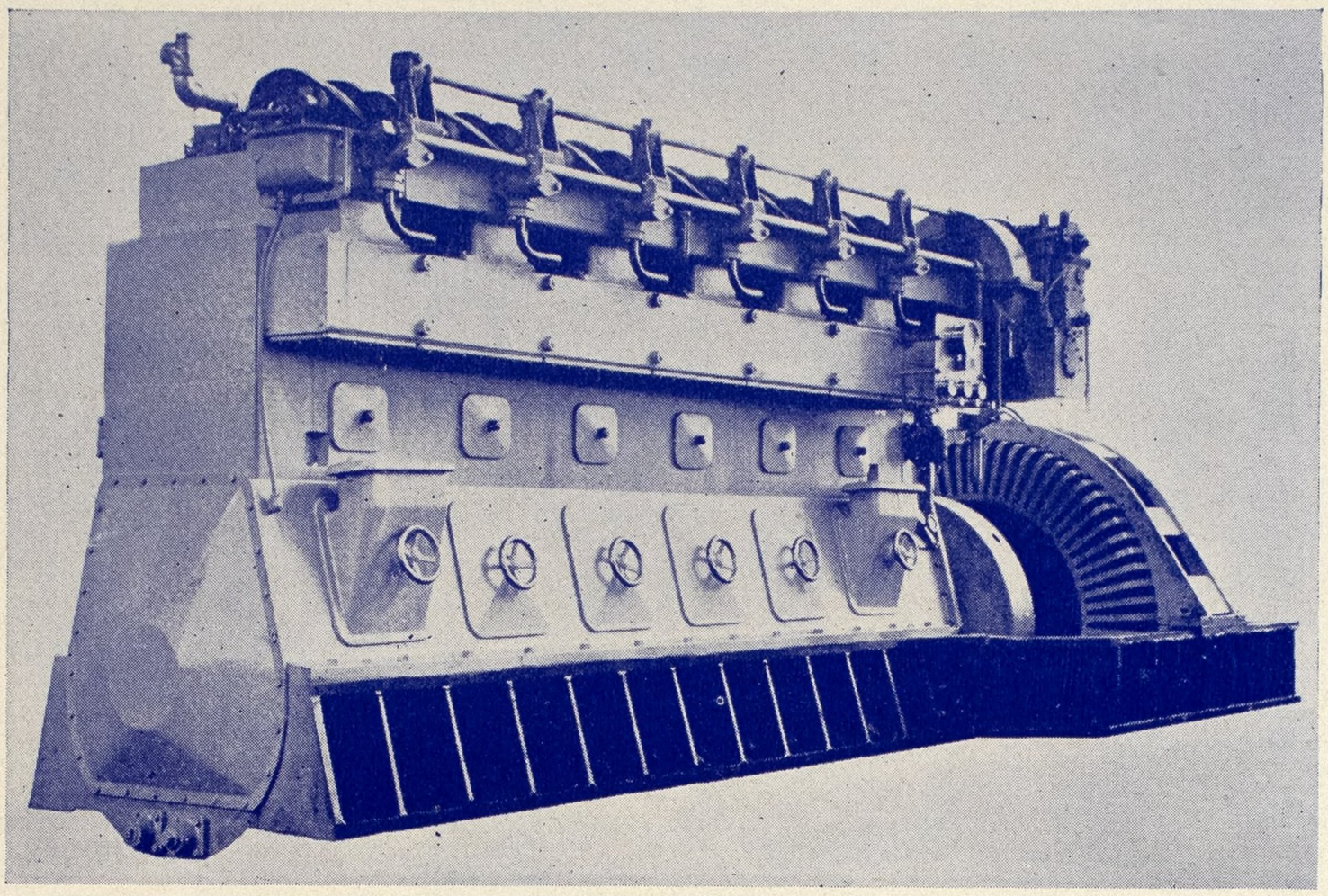
The CHILKAT goes up to Alaska as a tender to the packing fleet in the salmon industry.



M. S. CHILKAT—This Single Screw Seagoing Towboat Is Fitted With an Atlas Imperial Engine of 500 Horsepower

Diesel Electric Drive in Dredge Keystone

One Engine—535 B. H. P.



DESCRIPTION

The main power plant in this dredge which is non-self-propelled is an airless injection, four cycle, six-cylinder, single acting diesel engine as illustrated and described on this page direct connected to one 500 k. v. a. 25 cycle, 2400 volt alternating current generator and a 24 k. w. 125 volt direct current exciter. All machinery is electrically driven.

Engine

Name of Engine—Winton; **Year**—1929
Builder—The Winton Engine Co.; **Cycle**—4
No. of Cylinders—6; **B. H. P.**—535
Action—Single; **Injection**—Solid (Airless)
Piston Coolg.—None; **Bore**—14 in.; **Stroke**—16 in.
R. P. M.—375; **Piston Speed**—1000 feet per min.
Pressure Brake—69.5 **B. H. P. per Cyl.**—89
Stroke to Bore—1.14; **Wkg. Strokes per Rev.**—3
Lgth. O. A.—22′ 10 13/16″; **Wdth. O. A.**—7′ 5″
Height—From base to top of engine—7 ft. 6⅛ in.
Weight—Engine and generator—60,000 lbs.
Weight—Lbs. per b. h. p. one unit, 112 lbs.
Reversing—None; **Air Compressor**—None

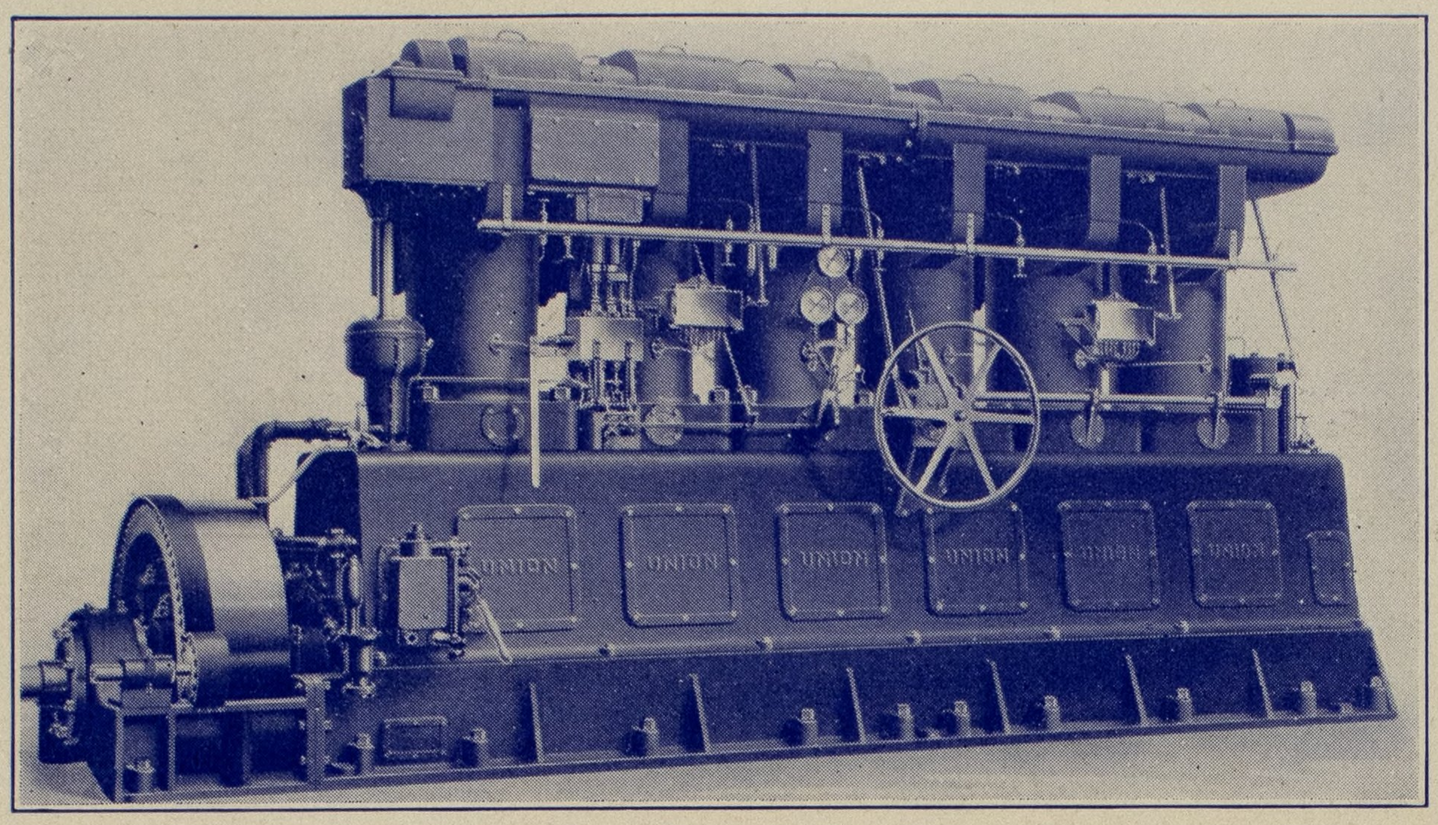
Vessel

Name—Keystone; **Type**—Hydraulic dredge
Owner—Cleveland Engineering Construction Co.
Builder—Rebuilt by American Ship Building Co.
Completed—Rebuilding completed in 1929
Length B. P.—110 feet; **Beam**—34 feet 6 inches
Depth—7 feet—Non-self-propelled
Displacement—400 tons; **Fuel Capacity**—475 bbls.
Fuel Consump.—Lbs. per b. h. p. per hour—0.45
Generators—One 500 k. v. a. alternating current and one 24 k. w. direct current exciter of Westinghouse manufacture, direct connected to the diesel engine described here, furnishing power for electric motors to drive all machinery.

Hydraulic Dredge KEYSTONE—Fitted With Winton Diesel Engine Driven Westinghouse Generating Sets

Diesel Direct Drive in Fishing Boat San Joao

One Engine—400 B. H. P.



DESCRIPTION

One of these engines of heavy duty enclosed type with overhead camshaft, with full forced feed lubrication to all bearings is installed in the fishing schooner illustrated below. The cylinders are individual castings set on the crank enclosure and secured by four stay bolts each, which extend through the enclosure to heavily ribbed bed.

Engine

Name of Engine—Union diesel; **Year**—1929
Builder—Union Diesel Engine Co.
Cycle—4; **No. of Cyls.**—6; **B. H. P.**—400
Action—Single; **Injection**—Mechanical
Piston Cooling—None, cylinders of trunk type
Bore—13½ in.; **Stroke**—20½ in.; **R. P. M.**—225
Piston Speed—770 feet per minute
B. H. P. per Cyl.—66.6; **Stroke to Bore**—1.52
Working Strokes per Rev.—3; **Press. Brake**—84
Length O. A.—22 ft. 1⅝ in.; **Width O. A.**—5 ft.
Height O. A.—10 ft. 7½ in.; **Wght.**—68,000 lbs.
Weight—Lbs. per b. h. p.—170
Reversing—Direct, by sliding camshaft
Air Compressor—For starting air only

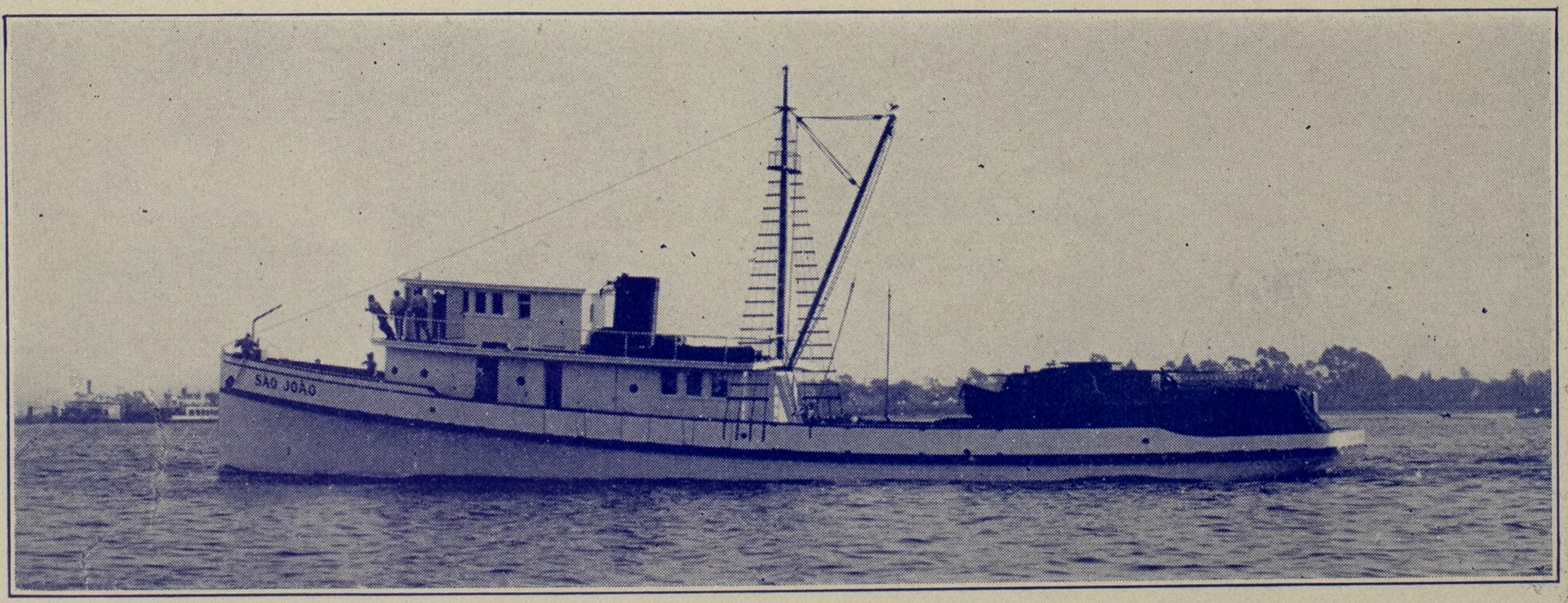
Vessel

Name—San Joao; **Type**—Fishing schooner
Owner—J. O. Medina & Co.
Builder—Campbell Machine Co.
Completed—Aug. 1929; **Drive**—Direct diesel
Length B. P.—120 ft.; **Beam**—26 ft.
Draft—11 ft. 6 in.; **Displacement**—350 tons
Speed—10½ knots; **No. of Propellers**—One
Fuel Consump.—Lbs. per b. h. p. per hr.—0.42
Fuel—1.9 tons per day, all purposes
Generator—One, 30-Kilowatt Westinghouse electric generator, driven at 600 revolutions per minute by a direct connected 45 horsepower Union diesel

Remarks

This vessel, the SAN JOAO, is a type of vessel developed by off shore fishermen on the West Coast. This vessel is schooner rigged and with her single diesel engine will be able to operate at a good rate of speed and at the same time very economically in fuel consumption. Electricity is used for driving the auxiliary machinery and is cheaply generated by a diesel engine set.

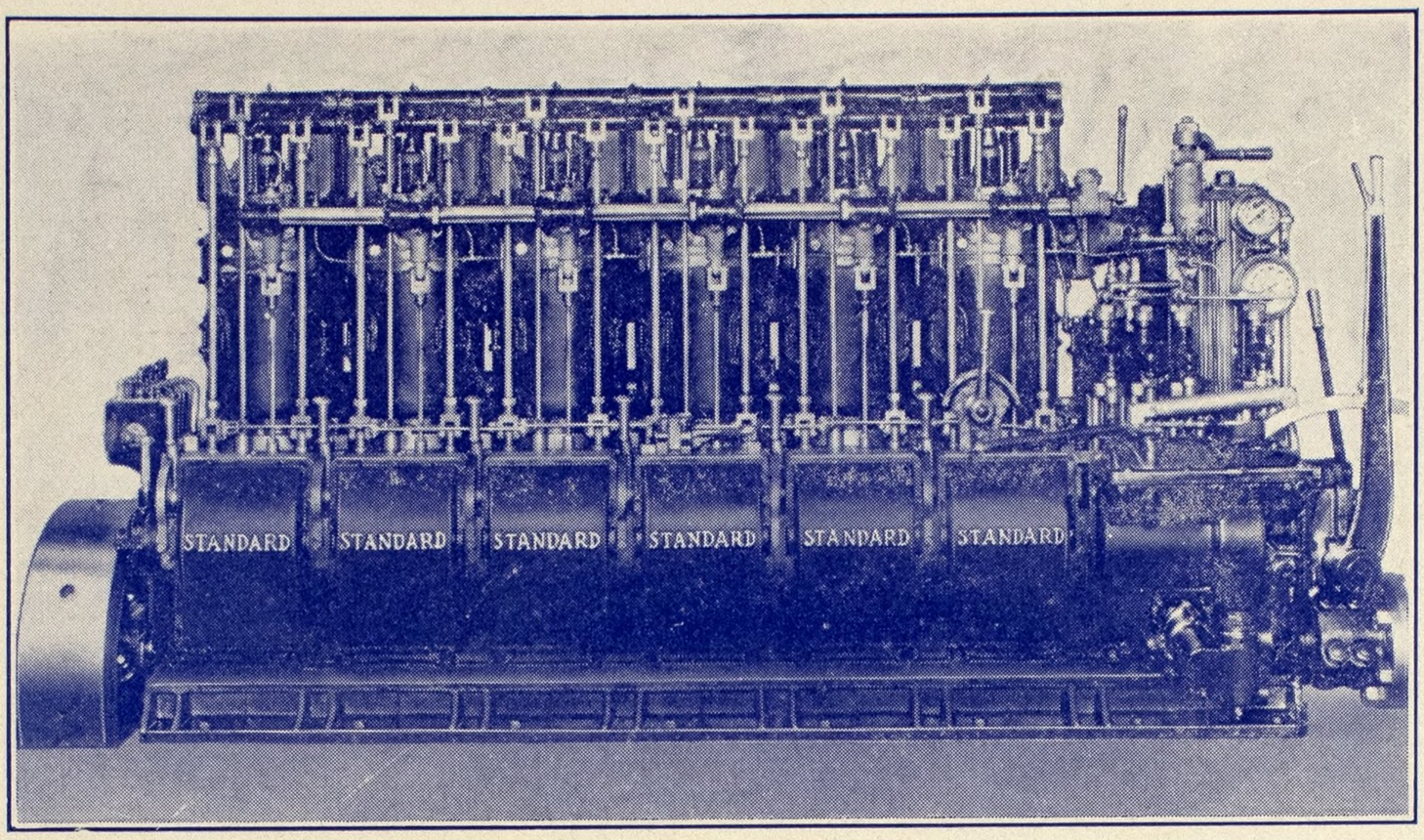
The fuel system of the Union diesel engine is of special interest because of the simultaneous control of the injection valve and fuel pump suction valve opening.



Fishing Schooner SAN JOAO Fitted With One 400-Horsepower Union Diesel Engine Direct Connected to Propeller

Diesel Direct Drive in Henrietta Frances

One Engine—220 B. H. P.



DESCRIPTION

One engine of this size and type of 220 brake horsepower is direct connected to a single propeller in this freight boat for service on Chesapeake bay. The engine is of single acting, four-cycle, heavy duty, solid injection marine type. It is a simple rugged dependable engine and stands up under continuous heavy service in every-day operation.

Engine

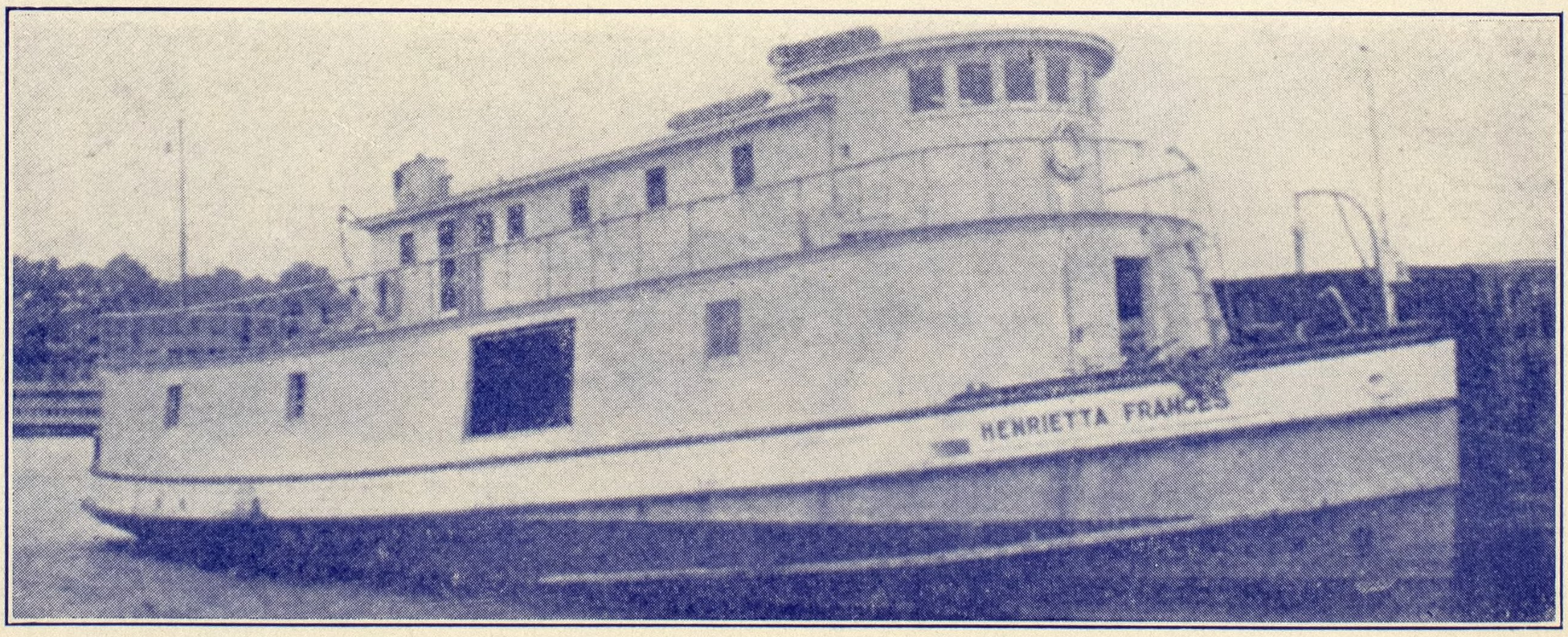
Name of Engine—Standard diesel; **Year**—1929
Builder—Standard Motor Construction Co.
Cycle—4; **No. of Cylinders**—6; **B. H. P.**—220
Action—Single; **Injection**—Mechanical (solid)
Piston Cooling—Air; **Bore**—10 in.; **Stroke**—14 in.
R. P. M.—300; **Piston Speed**—700 feet per min.
Pressure Indicated—88; **Pressure Brake**—75
B. H. P. per Cyl.—36.7; **Mech. Efficiency**—85%
Stroke to Bore—1.40; **Wkg. Strokes per Rev.**—3
Length O. A.—14 ft. 2 5/16 in.
Height O. A.—5 ft. 2 in.; **Width O. A.**—46¼ in.
Weight—20,000 lbs.; **Lbs. per B. H. P.**—91
Reversing—Direct by shifting camshaft
Air Compressor—Attached; starting air only

Vessel

Name—Henrietta Frances; **Type**—Bay freighter
Main Drive—Diesel direct connected
Length B. P.—92 feet; **Beam**—22 feet
Depth—7 ft. 9 in.; **Draft**—8 feet loaded
Deadweight—125 tons of cargo
Speed—8.75 knots; **No. of Propellers**—One
Fuel Capacity—7000 gallons diesel fuel oil
Fuel Consumption—Lb. per b. h. p. per hr.—0.45
Radius Without Refueling—Eight weeks

Remarks

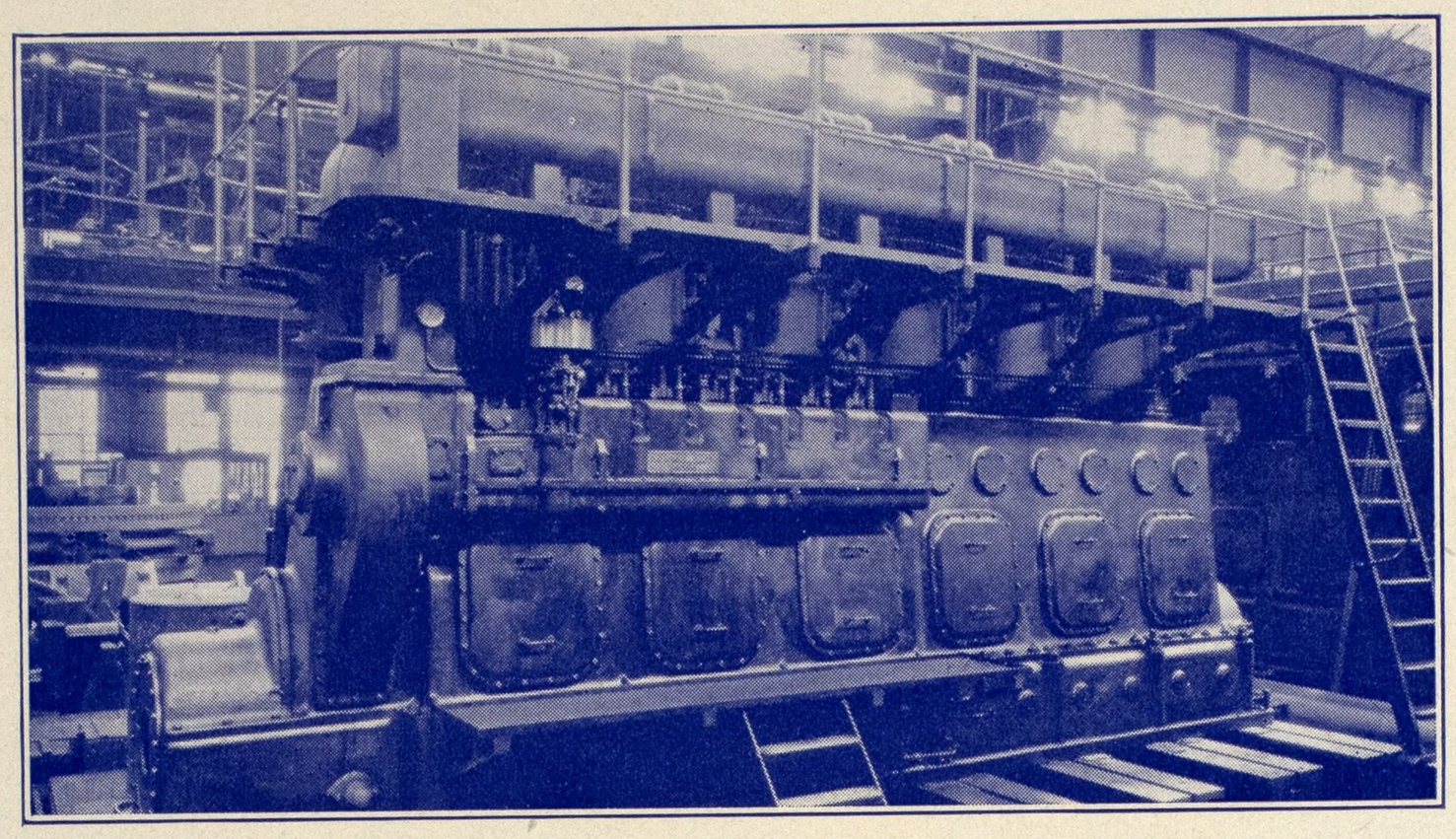
The true benefits from the low fuel consumption of the diesel engine are probably realized more fully in the case of a boat such as that illustrated here than in almost any other instance. The owner of the boat is in direct contact with the operation and he is in position to feel directly the difference in the fuel bill with his new diesel engine installation; also he is able to give the operation of the engine, careful attention. There is another factor which enters into the comparative economy between the present diesel drive and the former steam installation. In the latter case it is likely that the steam machinery was of the least economical type. By contrast the savings are greater.



HENRIETTA FRANCES powered with one 220 H. P. Standard Diesel—In service on Chesapeake Bay

Diesel Electric Drive in Tanker Tidewater

Two Single Acting Engines—Each 625 B. H. P.



This Is a Stationary De La Vergne Engine of Same Type as in the TIDEWATER Except for Changes Suitable for Marine Service

DESCRIPTION

Two engines of this size and type, six-cylinder, nonreversible, heavy duty, solid injection of 625 shaft horsepower each, at 225 revolutions per minute are direct connected to direct current generators rated at 410 kilowatts each at the engine revolutions, 250 volts, shunt wound. The mean effective pressures are low. Silent chain driven camshafts.

Engine

Name of Engine—De La Vergne; **Year**—1929
Builder—I. P. Morris & De La Vergne, Inc.
Cycle—4; **No. of Cyls.**—6; **I. H. P.**—790
B. H. P.—625; **Act.**—Single; **Inject.**—Solid
Scavenging—None; **Piston Cooling**—None
Bore—17 in.; **Stroke**—24 in.; **R. P. M.**—225
Piston Speed—900 ft. per min.; **Press. Ind.**—85
Pressure Brake—67.2; **B. H. P. per Cyl.**—104
I. H. P. per Cyl.—132; **Mechanical Eff.**—79%
Stroke to Bore—1.41; **Wkg. Strokes per Rev.**—3
Lgth. O. A.—34 ft. 7¾ in.; **Width**— 7ft. 8 in.
Height Overall—13 ft. 3 in.; **Weight**—150,000 lbs.
Weight—Lbs. per B. H. P.—240; **Per I. H. P.**—190
Reversing—None; **Air Compressor**—None

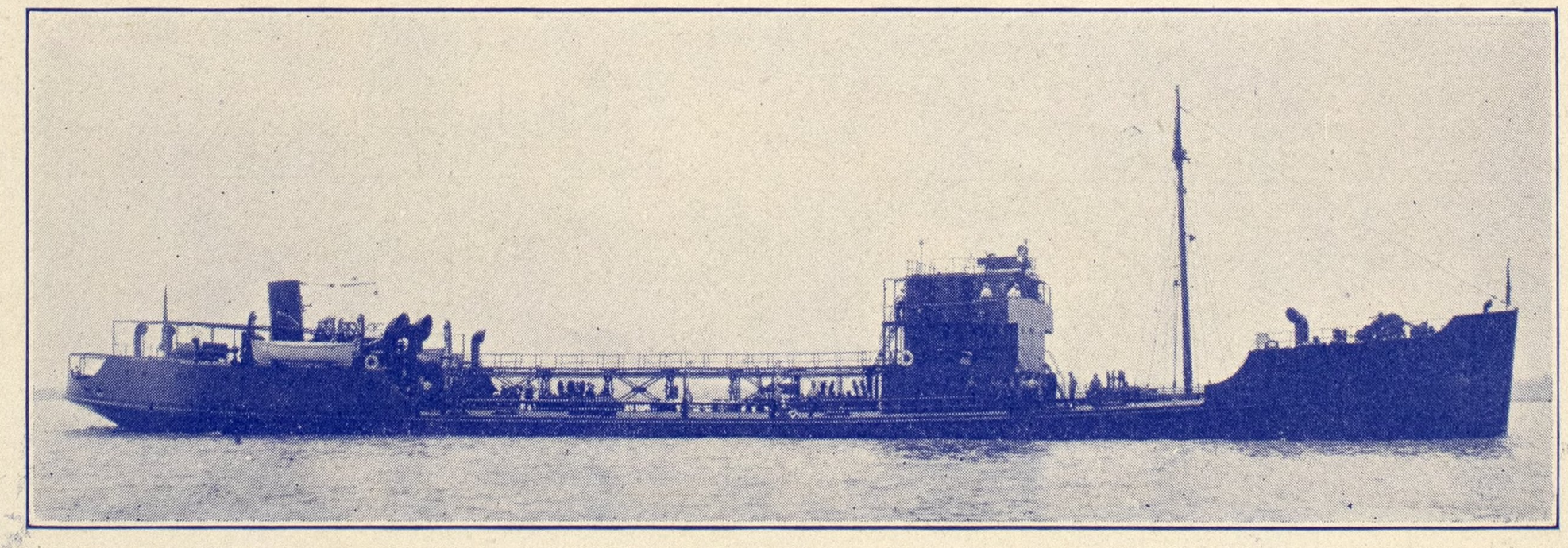
Vessel

Name—Tidewater; **Type**—Oil tanker
Owner—Tidewater Oil Co.; **Builder**—Pusey & Jones
Completed—June '29; **Drive**—Diesel electric
Lgth. B. P.—225 ft.; **Bm.**—44 ft.; **Dth.**—18 ft. 6 in.
Draft Molded—15 ft. 6 in.; **Displ.**—3600 tons
Deadweight—2300 tons; **Speed**—10½ knots
Number of Propellers—One
Fuel Consumption—Lbs. per b. h. p. per hour—0.42
Tons Fuel Per Day—5½ at full load

Remarks

The diesel electric drive in this vessel includes for each of the two main diesel engine units one 410-kilowatt main generator and one 45-kilowatt auxiliary generator. There is also one auxiliary diesel generator unit of 45-kilowatt capacity. The electrical equipment, including the double propulsion motor, direct connected to the propeller, and which is rated at 1000 shaft horsepower at 130 revolutions per minute and 500 volts, is of General Electric manufacture.

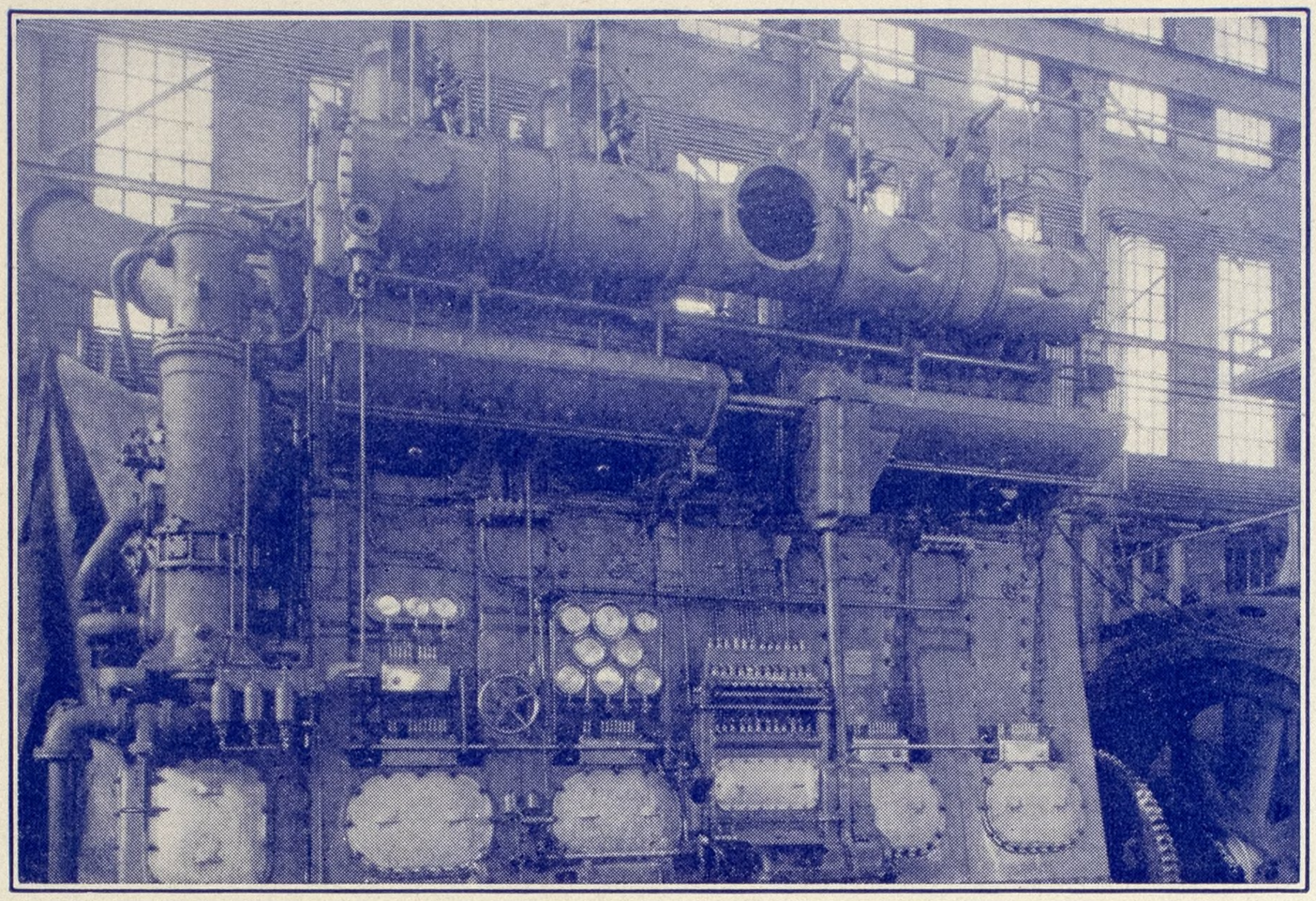
The vessel is a clean oil tanker of modern appointments and is electrically equipped throughout including the galley and radiators in living quarters. The vessel plies out of Bayonne, N. J., and ports from Norfolk, Va., to Portland, Me.



Single Screw Diesel Electric Tanker TIDEWATER Built by Pusey & Jones—Fitted with De La Vergne Engines

Diesel Direct Drive in Freighter Potter

One Double Acting Engine—3625 B. H. P.



DESCRIPTION

One engine of this size and type direct connected to the propeller is fitted in the shipping board vessel POTTER illustrated below and in a similar ship the JEFF DAVIS. It is a double acting, air injection, four-cylinder two-cycle engine. The horsepower is developed at 115 revolutions per minute. On the trial of the POTTER in light condition a top speed of 15.72 knots was attained.

Engine

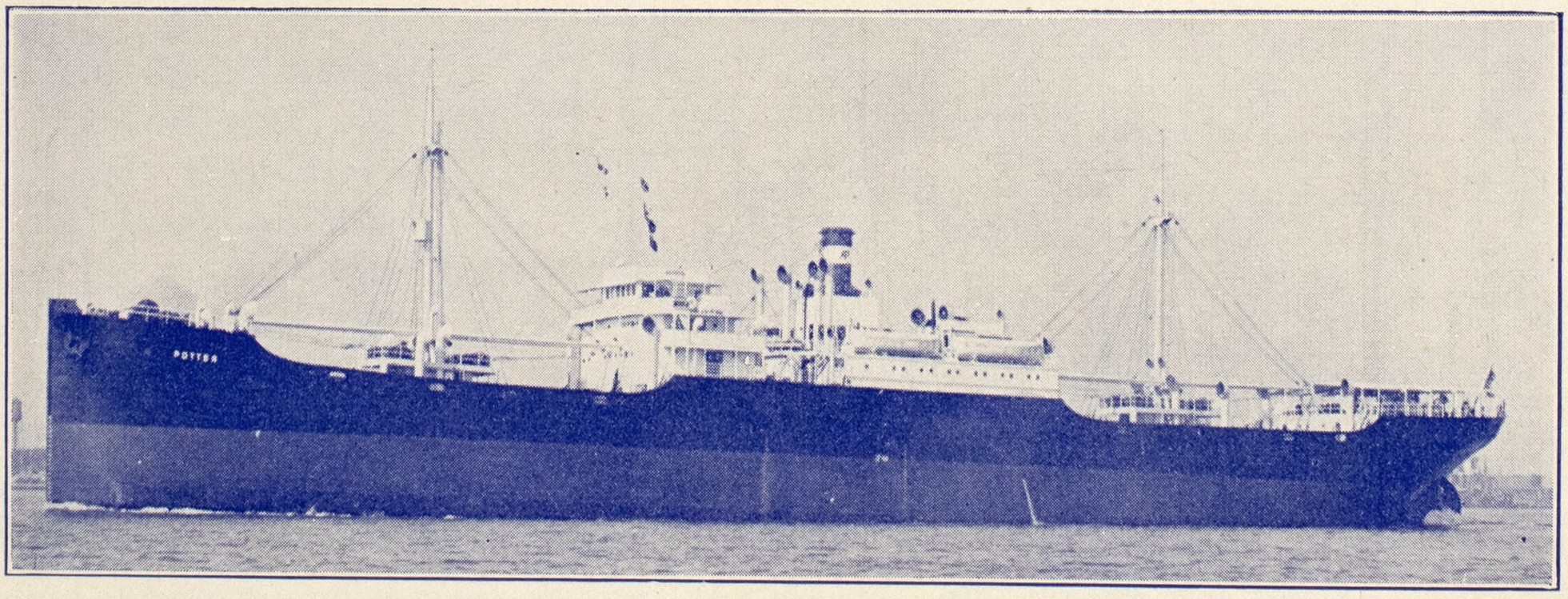
Name of Engine—Worthington; **Year,** 1929
Builder—Worthington Pump & Machy. Corp.
Cycle—Two; **No. of Cyls.**—4; **B. H. P.**—3625
Action—Double; **Injection**—Air
Scavenging—Port—Independent Blowers
Piston Cooling—Fresh water; **Bore**—28 inches
Stroke—40 inches; **R. P. M.**—115
Pist. Spd.—835 f. p. m. **Press. Ind.**—85
Press. Brake—67; **B. H. P. per Cyl.**—900
I. H .P. per Cyl.—1150; **Mech. Eff.**—78.8%
Stroke Bore—1.428; **Wkg. Strokes to Rev.**—8
Lgth. O. A.—32 ft. 5 in.; **Hght. O. A.**—31 ft. 1½ in.
Height C. L. Shaft to Top—26 ft. 5½ in.
Width O. A.—13 ft. 0 in.; **Weight**—735,676 lbs.
Weight All Machinery—1,142,676 pounds
Weight per B. H. P. Eng. only—203 lbs.

Vessel

Name—Potter; **Owner**—U. S. Shipping Board
Builder—Converted by Maryland Dry Dock
Type—Ocean freighter; **Completed**—Sept. 1929
Length O. A.—411 ft. 9 in.; **B. P.**—395½ ft.
Beam—55′; **Depth**—34′ 11″; **Draft** 27′ ¼″
Displ.—13,000 tons; **Deadweight**—9300 tons
Speed—13 knots; **No. of Propellers**—One
Fuel Consumption—Lbs. per b. h. p. per hour—0.33
Fuel—Tons per day—18.5

Remarks

The motorship POTTER was given a successful sea trial on Sept. 12. In light condition she averaged 15.08 knots during a six hour trial. A sister ship, the JEFF DAVIS, with identical diesel engine drive had her sea trial on Oct. 17. Both of these two vessels were converted from steam to diesel drive by the Maryland Dry Dock Co., Baltimore.



M. S. POTTER—Ocean Cargo Vessel Fitted With One Double Acting Diesel Engine of 3625 B. H. P.

Turbine Electric Liner Pennsylvania on Trial Run, Sailed from New York on Her Maiden Voyage Oct. 19

Pennsylvania Sails on Maiden Trip

Third Turbine Electric Liner Built in Record Time—Greatest Merchant Ship Constructed in America—Completion of $21,000,000 Program

SAILING from New York, Oct. 19, on her maiden voyage, with a full complement of 800 passengers, the turbine electric liner PENNSYLVANIA joins her sister ships VIRGINIA and CALIFORNIA in the intercoastal service of the Panama Pacific line, and is due to arrive at San Francisco, Nov. 4.

Built by the Newport News Shipbuilding & Dry Dock Co., the PENNSYLVANIA, launched on July 10, and her sister ship the VIRGINIA are the largest merchant ships so far built in an American yard. She was delivered five months ahead of schedule, which is probably a record for so elaborate a vessel. Her keel was laid in October, 1928, and she was delivered in less than one year. The PENNSYLVANIA is an "electric liner" in every sense.

Driven by electric power, she is heated, ventilated and has all auxiliary machinery operated by electric current. Her power plant would supply the needs of a city the size of Harrisburg, Pa. She is 613 feet 1½ inches in length overall, 80 feet beam, 20,800 tons gross register, 33,375 tons displacement and measures 100 feet from upper deck to keel.

On her trial run, the PENNSYLVANIA exceeded all requirements, especially in speed. Planned for 18 knots, the big liner made better than 19 during a 12-hour trial off the Virginia coast. Her best speed was 19.3 knots during a 67-mile run between the Chesapeake Lightship and Winter Quarter shoals. In every way the ship bettered expectations of her builders and owners.

Arriving at New York with a special party of invited guests, which included marine men and representatives from the state from which she was named, the PENNSYLVANIA was the object of much interest for a week previous to sailing on her maiden voyage, many inspecting the liner at her pier.

Passengers aboard the PENNSYLVANIA to New York were specially impressed with the lack of vibration, there being practically no evidence of this at any speed during the trip up the coast. Aboard were A. J. McCarthy, general manager of the Panama Pacific line, who acted as the representative of the International Mercantile Marine Co., owner of the line; J. S. Mahool, passenger traffic manager of the International Mercantile Marine Co.; E. H. Cocke, assistant passenger traffic manager; Roger Williams, operating manager of the International Mercantile Marine Co., and Frederick Bird, general passenger agent, and a group of technical experts of the General Electric Co., builder of the machinery of the new liner. The party went to Newport News, Va., by special train from New York, Friday, Oct. 11, and arrived in New York on the liner early Sunday, Oct. 13.

Homer L. Ferguson, president of the Newport News Shipbuilding &

Dry Dock Co., which has built all three of the new turbine electric liners, was a guest on the liner and was well satisfied with the ship's performance. When delivering the ship to the owners he said, "Gentlemen, I am transferring to you today the greatest merchant vessel ever built in America."

Mr. Ferguson was optimistic about the outlook for shipbuilding and said his own yard had sufficient work ahead to assure steady employment to those who provide for the 30,000 people who are dependent on this great Virginia shipyard. The company's next two liners will be two 20,000-ton vessels for the Ward line on the New York-Havana run; and it has also placed a bid for the two big liners to be built for the United States lines.

The master of the PENNSYLVANIA is Captain H. A. T. Candy, senior commander of the line, formerly on the VIRGINIA. He took the first two ships to the Pacific coast on their maiden voyages. The chief engineer is John Carstairs, also recently of the VIRGINIA, and the purser is Leo J. Gallagher.

Propelled by Twin Screws

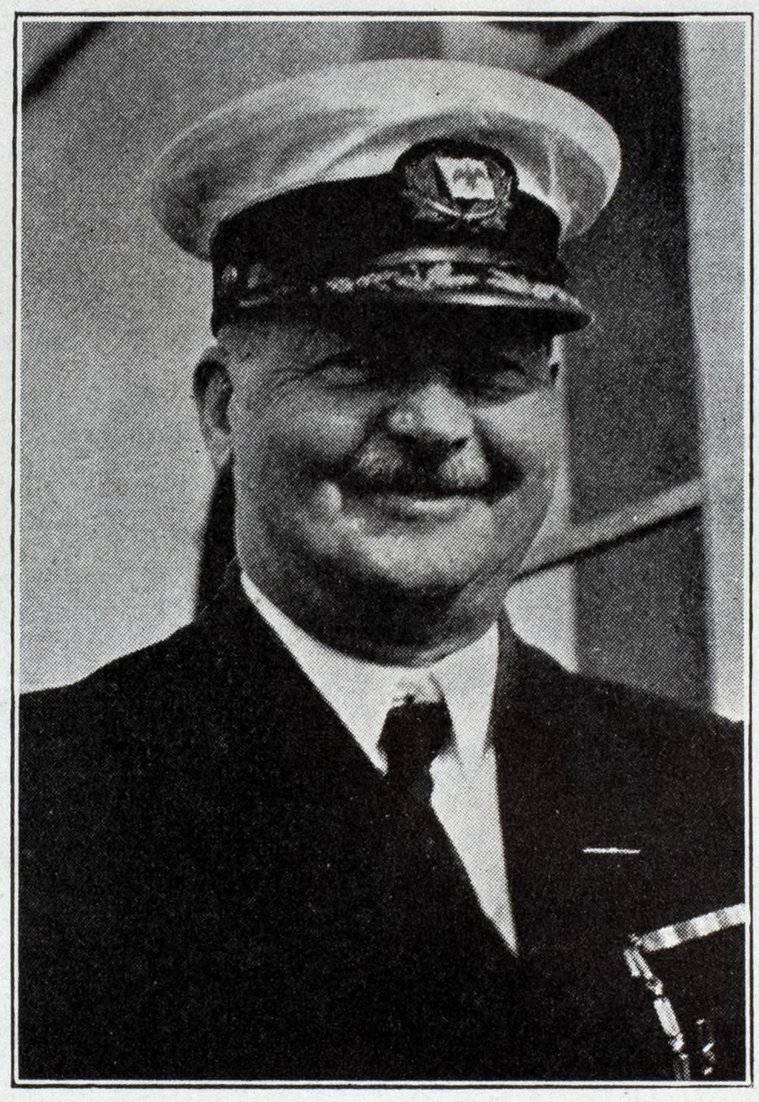
Her sailing schedule calls for the arrival of the PENNSYLVANIA at Havana, Oct. 22, at Balboa three days later, at San Diego, Nov. 1, at Los Angeles the next day, and the completion of the first voyage in service at San Francisco on Nov. 4.

The PENNSYLVANIA, slightly larger in displacement than her sister ship, the VIRGINIA, and some 12 feet longer than the CALIFORNIA, has twin screws, each propeller being driven directly by an 8500-horsepower motor at approximately 110 revolutions per minute. Electricity for driving these motors is generated by two marine-type steam turbines, each directly connected to an alternating current generator rated at 5250 kilowatts at 2640 revolutions per minute. Steam for driving the turbines is furnished by eight Babcock & Wilcox water-tube boilers equipped with oil burners.

The twin driving motors of 17,000 collective horsepower, although coupled directly to the driving shafts, can be changed from full speed ahead to full speed astern, or the reverse, in 15 minutes. The PENNSYLVANIA'S fuel capacity is sufficient for a complete round trip of 11,000 miles between New York and San Francisco. Auxiliary and refrigerating machinery, deck winches, pumps, ventilating system, boat davits, elevators, freight lifts and kitchens are all electrically operated. The main and auxiliary turbines and all the electrical equipment, like that for her two sister ships, are of General Electric Co. manufacture.

With all outside rooms, she will have accommodations for 800 passengers, equally divided between first and tourist cabins, while her enormous holds will have a maximum capacity for 10,000 tons of cargo with large refrigerated and air-cooled spaces for perishable and semiperishable commodities, including fruit. At an average speed of 18 knots the great liner, without being pushed, will make the 5000-mile journey from coast to coast in 13 days.

She is named after the famous American liner PENNSYLVANIA, flagship of the American Steamship Co. of Philadelphia, a first class flyer of her day, which made history for the American flag in the early seventies



Capt. Henry A. T. Candy
Commander of the S. S. Pennsylvania

on the run between Philadelphia and Liverpool. The decorations of the new liner are commemorative of the Pennsylvania of the revolutionary period, combined with reminders of the Spanish regime in the Carribean and the days of the forty-niners.

The PENNSYLVANIA is designed to provide the utmost comfort for passengers in the changing climates through which it will pass in the 11,000-mile round trip from New York to the Coast and return. Every cabin is outside, and every cabin has a bed, even in the tourist class. The tourist class accommodations rank with the finest on any ship afloat.

Public rooms have been designed to make the most of fresh air and sunshine, being lofty and equipped with large windows that open outward in casement fashion. As in the large liners built recently for transatlantic service, the first class public rooms are all on the promenade deck. The decorations in these depict the history of the state of Pennsylvania.

Among the decorations in the smoking-room are life-size portraits of William Penn, Benjamin Franklin, Robert Morris and "Mad Anthony" Wayne. The walls of this room are paneled in old pine, after the fashion of Colonial home interiors. All the paintings are copies of well known portraits in the Pennsylvania museum and were done by Mrs. Carola Spaeth of Philadelphia. Charles V. John, another Philadelphia artist, has done several canvases for the lobbies, one being "The Meeting of Jefferson, Franklin and Madison," representing them as they came together to draft the Declaration of Independence.

Smooth Vibrationless Operation

Like her two sister ships, VIRGINIA and CALIFORNIA, the PENNSYLVANIA is free from vibration—a feature of the turbine electric drive. These vessels glide through the water silently and smoothly even at full speed, and until they become accustomed to the absence of noise and vibration, passengers when within doors have the sensation that the ship is stopped.

This, however, is only one of the many advantages of this form of propulsion which have been briefly outlined by Eskil Berg, marine specialist and consulting engineer of the General Electric Co., as follows:

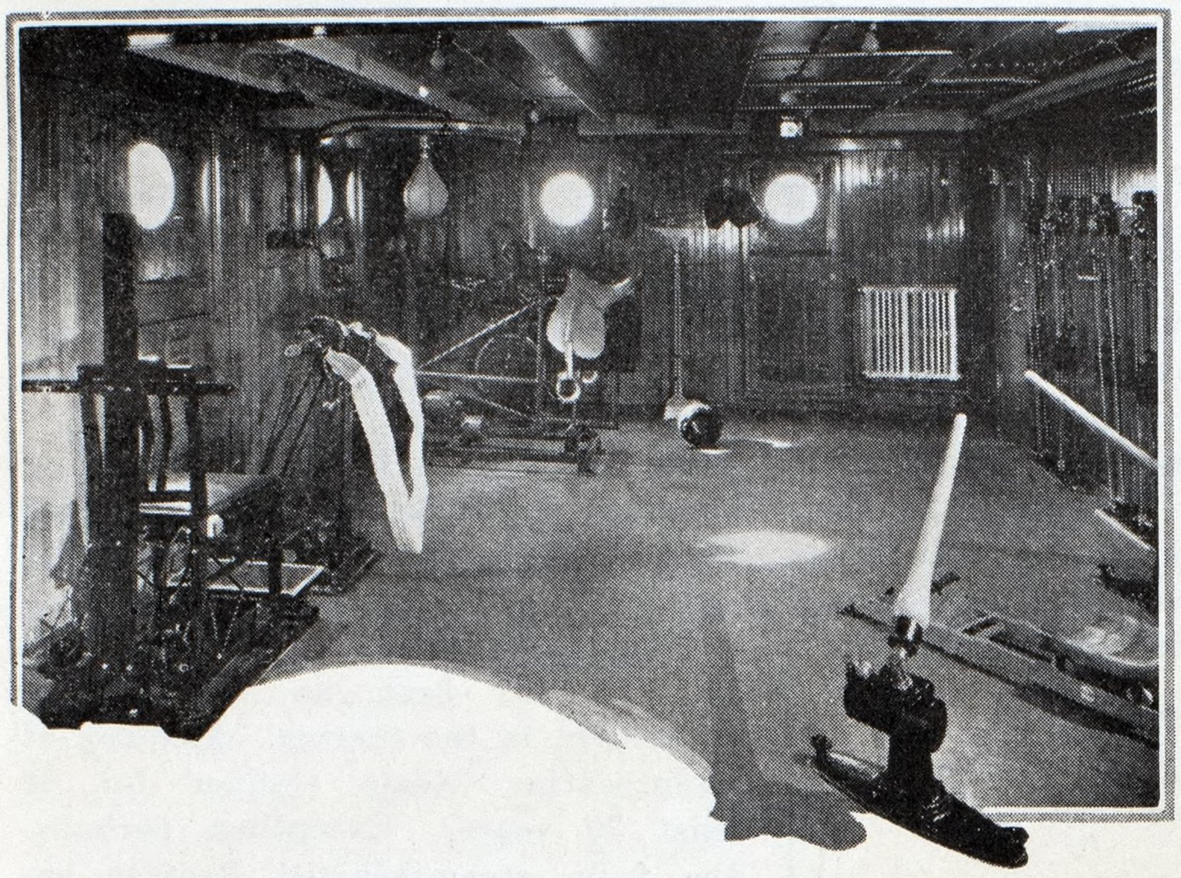
"Electric transmission gives a simple and practical means of speed reduction between the high speed turbine and the slow speed propeller in almost any ratio which may be desired.

"It affords means of reversal by simple change of electrical connections, without changing the direction of rotation of the turbine. Any desired reversing torque up to the full power of the turbine can be obtained without affecting the efficiency of the equipment in the forward direction. Reversal is obtained with a minimum amount of steam drawn from the boilers, as the full inertia of the turbo-generator is first used in the act of reversal and, in fact, in most cases actual reversal is obtained without drawing any steam from the boilers and steam is only used from the boilers to accelerate the propeller speed in reverse rotation.

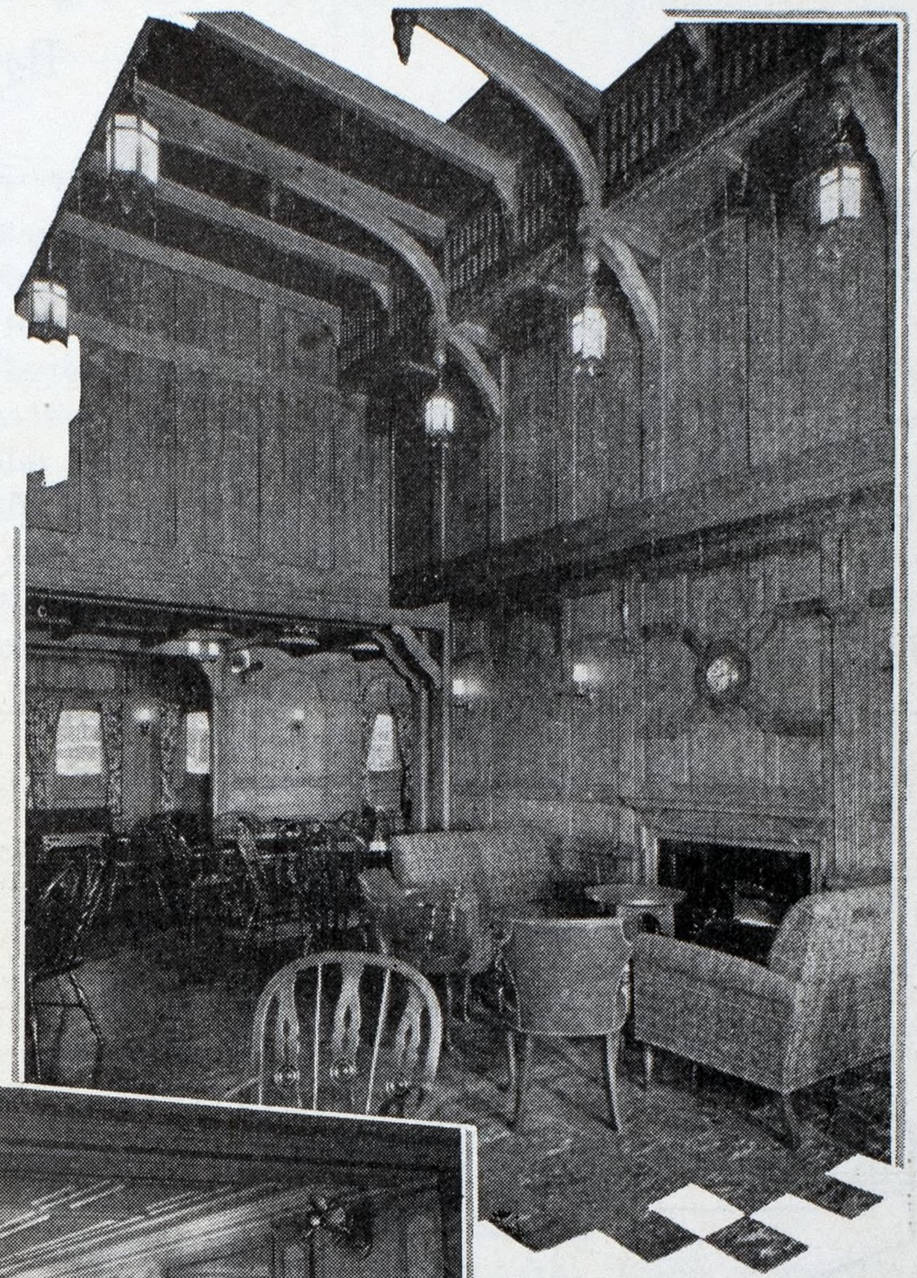
"Electrically driven vessels can be made noiseless whereas gears always make more or less noise.

"Electric drive makes it possible to obtain accurate data, either by instantaneous readings or by recording instruments, of the load on the propeller shaft under various conditions of sea and wind."

Interior Views of S. S. Pennsylvania



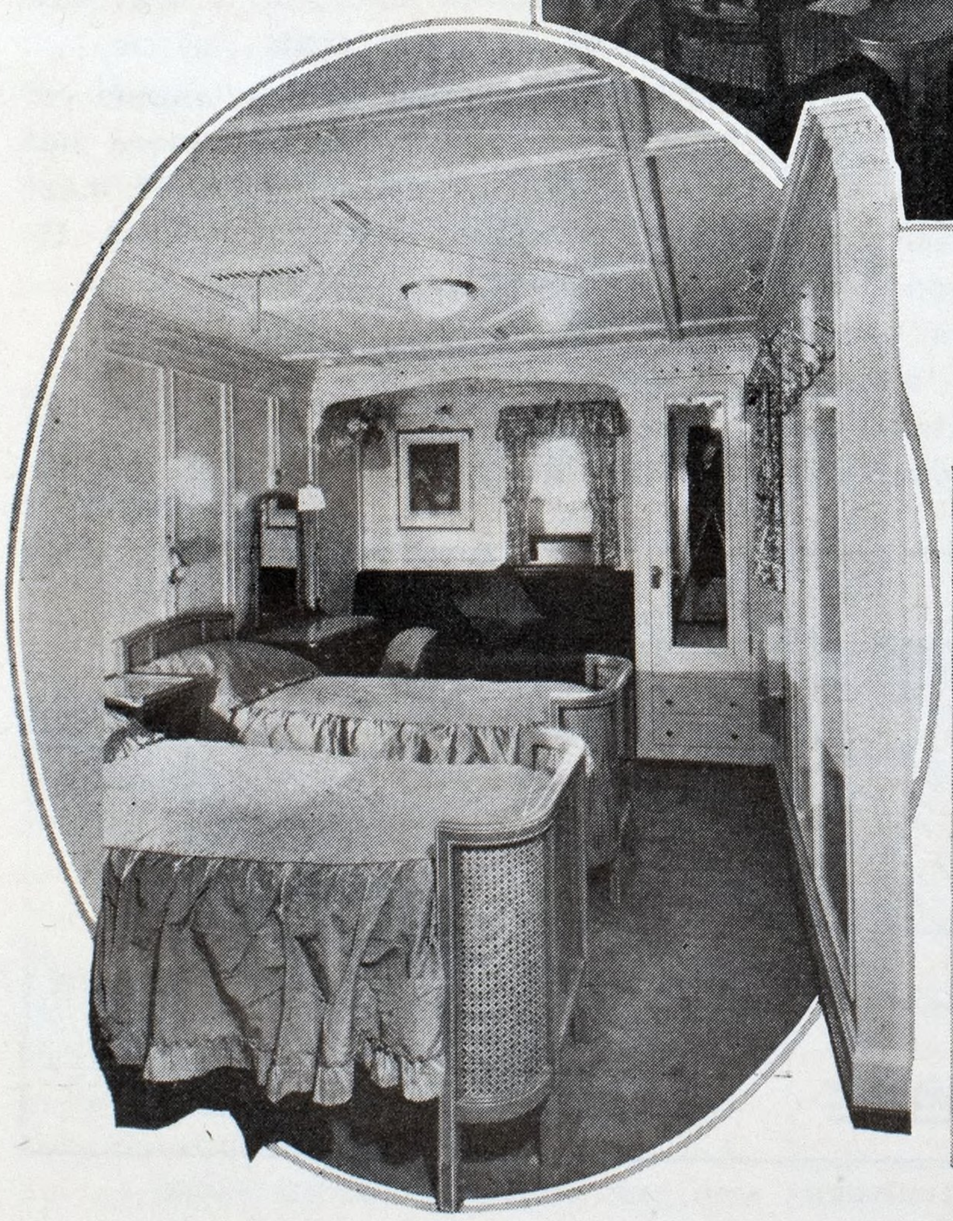
Above—Gymnasium with the latest modern equipment. For use of first class passengers



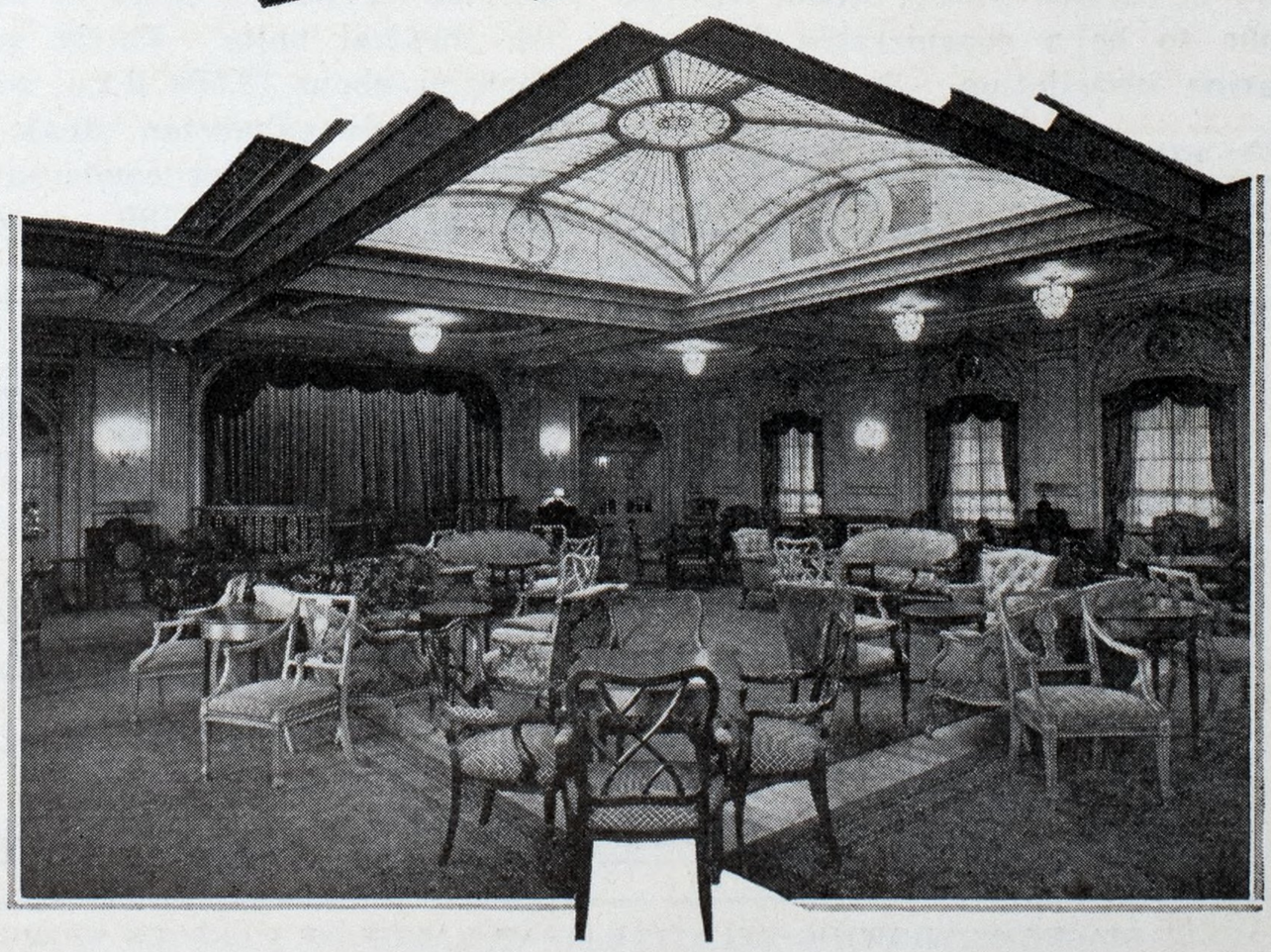
Right — The Verandah Cafe on the Promenade Deck has an uninterrupted view of the sea on three sides

Above — Smoking Room paneled in early Colonial style, modeled on the Parson Capen House at Topsfield, Mass.

Below—Bedroom in one of the suites which have private deck verandah



Below — First Class Lounge, showing the stage for shipboard entertainment.



Steam or Diesel—A Comparison

High Thermal Efficiency of Diesel Engine—Fuel Costs However Depend on Local Market—Saving in Machinery Space—Also in Weight

By Joseph Hecking

THE question of steam or diesel drive is surrounded by so many "ifs" and "whens" that it often is difficult to make a decision. It is frequently stated that diesel engines are suitable only for long-voyage ships. However, the majority of diesel engines is being installed in tugboats, fishing boats, yachts and small coastwise ships. Although, it is admitted that the greatest fuel saving occurs during long full-power runs, the standby or port savings are of no small value. Because conditions vary in various trades, steam will continue to be a considerable factor in marine installation. Availability and cost of fuel, availability of experienced personnel, first and operating costs, reliability of machinery and its weight and space, are items to be considered in making the choice between steam and diesel drive.

The relative merits of power generating plants are determined by their ability to turn the energy stored in fuel into useful work. Energy is the capacity of the fuel to liberate heat units, which are transformed into work by the moving mechanism. Extensive experiments have shown that one horsepower is equal to 2545 British thermal units. Fairly good coal contains about 13,500 B.t.u. per pound. Good triple expansion steam engines with surface or jet condensation, operating with about 180 pounds boiler pressure, require approximately 1¾ pounds of coal per shaft horsepower per hour. The overall thermal efficiency of the engine is, therefore,

$$\frac{2545}{13500 \times 1.75} = .1075 \text{ or } 10\tfrac{3}{4} \text{ per cent.}$$

If the boilers burn oil, requiring about 1.10 pounds of fuel of 18,500 B.t.u. content, the efficiency is

$$\frac{2545}{18500 \times 1.10} = .125 \text{ or } 12\tfrac{1}{2} \text{ per cent.}$$

There has been no notable improvement in the thermal efficiency of reciprocating steam engines for at least 30 years. Excepting, perhaps, the fully steamjacketed Prosser engine—and it is to be regretted that its development has not yet received the support it apparently deserves.

A modern marine turbine operating at 250 pounds working pressure, 150 degrees superheat and 28 inches vacuum, will require about 0.80 pound of liquid fuel of 18,500 B.t.u. per horsepower-hour. The heat efficiency is therefore,

$$\frac{2545}{18500 \times .80} = .172 \text{ or } 17.2 \text{ per cent.}$$

Several large-power installations have been made with 350 pounds boiler pressure and 200 degrees superheat. These have shown a fuel consumption as low as 0.65 pound per shaft horsepower-hour, or a heat efficiency of 21.2 per cent.

A well-designed diesel engine of 2000 brake horsepower or more has an overall fuel consumption of 0.425 pound per shaft horsepower-hour. Its heat efficiency is, therefore,

$$\frac{2545}{18400 \times .425} = .324 \text{ or } 32.4 \text{ per cent.}$$

This efficiency does not include the use of the heat available in the ex-

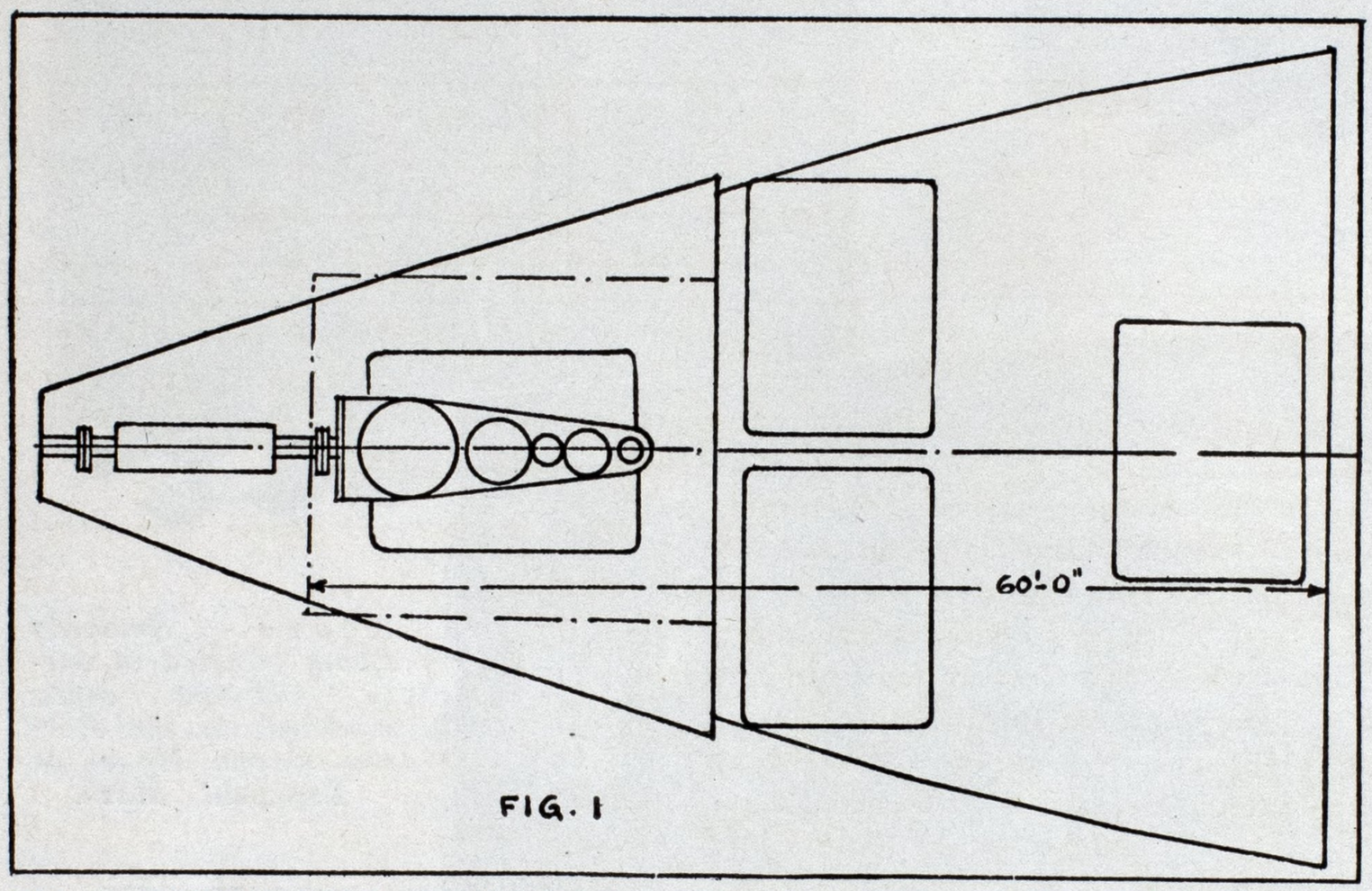
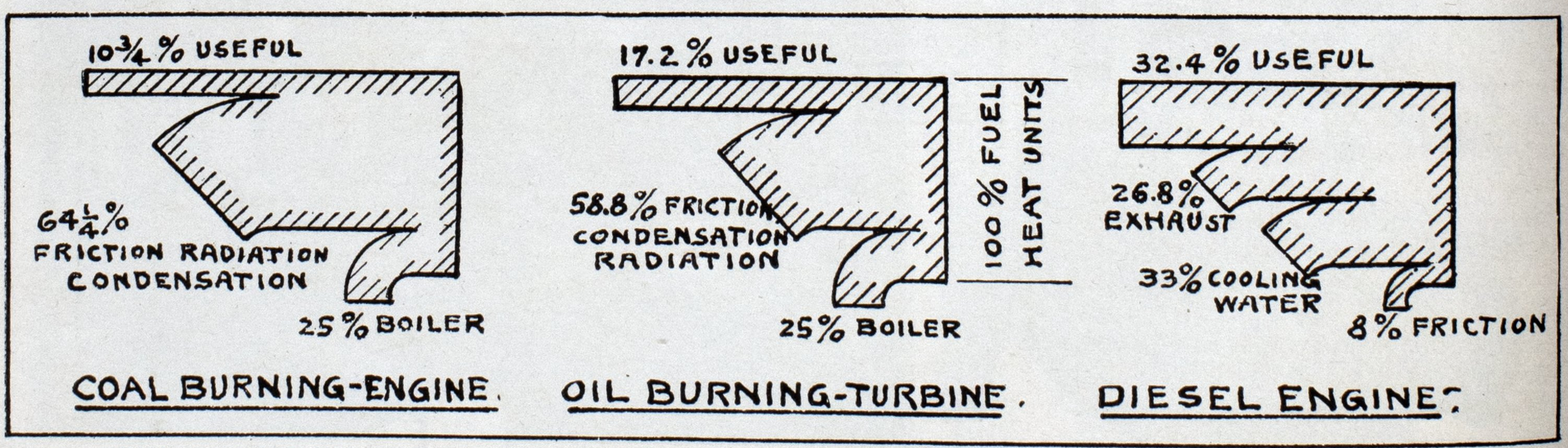


FIG. 1

FIG. 1—RECIPROCATING STEAM ENGINE—THREE SCOTCH BOILERS—TYPICAL SHIPPING BOARD VESSEL

The author, Joseph Hecking, is special marine representative of the Worthington Pump & Machinery Corp. This article was prepared for MARINE REVIEW at the request of the editor.



DIAGRAMS SHOWING RELATIVE HEAT VALUE OF VARIOUS PRIME MOVERS AND PER CENT OF USEFUL WORK

haust gas. The diesel engine exhaust frequently is used in a heat exchanger to generate steam for the steering engine and to heat the ship and heavy fuel oil. In passenger ships, the jacket water at 120 degrees Fahr. may be used for sanitary purposes.

The accompanying diagrams clearly show the relative heat value of the various prime-movers. They also show the cost of converting water into steam, and the advantages of burning fuel directly in the engine as is done in diesel engines.

All commercial ships are designed to carry a predetermined amount of profitable cargo on a fixed displacement. The latter frequently is restricted by a maximum draft. The fuel rates previously cited show that a diesel engined tugboat or yacht will travel four times as far as a coal burning steam engined tug on the same weight of fuel. They also prove that a 2500 horsepower diesel cargo vessel will carry 215 tons more cargo on a six day trip than a coal burning steamship of the same power. This is due to the saving in weight of fuel. Compared with an oil burning turbine ship, the diesel powered ship has a cargo advantage of 60 tons for a six day trip.

A Comparison of Fuel Costs

Whether or not the foregoing thermal efficiencies constitute a saving in fuel costs in favor of one of the systems depends on the local fuel market. Assuming, for the sake of comparison, that a short ton of coal costs $5.00, a barrel of boiler fuel $1.10 and a barrel of diesel fuel $2.00, the cost per shaft horsepower-hour on the basis of the stated efficiencies is:

For coal-burning reciprocating engines,

$$\frac{5.00}{2000} \times 1.75 = 43.7 \text{ cents}$$

For oil-burning reciprocating engines,

$$\frac{1.10}{42 \times 7.5} \times 1.1 = 38.3 \text{ cents}$$

For oil-burning steam turbines,

$$\frac{1.10}{42 \times 7.5} \times .80 = 28.2 \text{ cents}$$

For diesel engines,

$$\frac{2.00}{42 \times 7.5} \times .425 = 26.0 \text{ cents}$$

Note: A barrel of fuel contains 42 gallons. The weight per gallon is approximately 7.5 lbs.

It will be noted that under these fuel rates, the diesel engine has no financial advantage over the steam turbine. Also, that with cheaper boiler fuel and greater turbine efficiency, the advantage may lie with the turbine. However, diesel engines, especially in the larger sizes, are not restricted to the use of diesel oil. With proper preheating, to make them flowable through the small fuel pipes, and by centrifuging, to eliminate water, sand and free carbon, the heavier and cheaper fuels can be burned satisfactorily in diesel engines. Assuming that a diesel engine is using a 50-50 mixture of boiler and diesel oil, the cost per horsepower-hour is 21 cents. This is half the cost of coal and 75 per cent that of turbine fuel.

It appears that on the Great Lakes no serious endeavors have been made by the oil companies to enter into competition with coal industry. However, present inquiries and plans for the building of tankers appear to indicate that greater and better distribution of oil is receiving considerable attention.

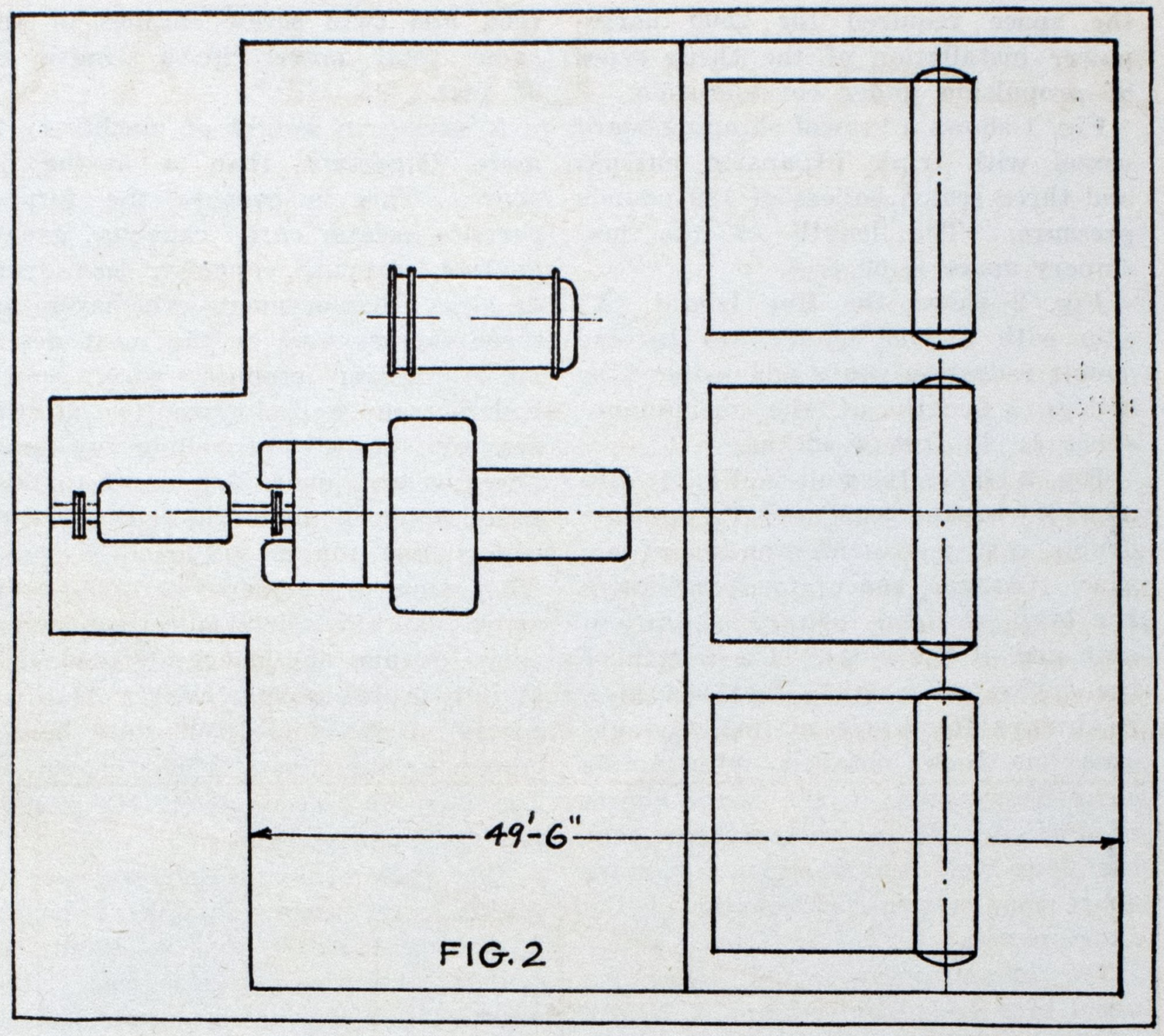


FIG. 2

FIG. 2—HOG ISLAND TYPE OF SHIP—2500 H. P. TURBINE—WATER TUBE BOILERS

How Machinery Space Compares

Size of machinery space frequently is of prime importance. A saving in length of machinery space permits either of greater cargo space in vessels of a predetermined length or of a shorter ship for a fixed deadweight tonnage. The application of this rule, however, depends on the weight of the machinery and the nature of the cargo.

The accompanying illustrations show

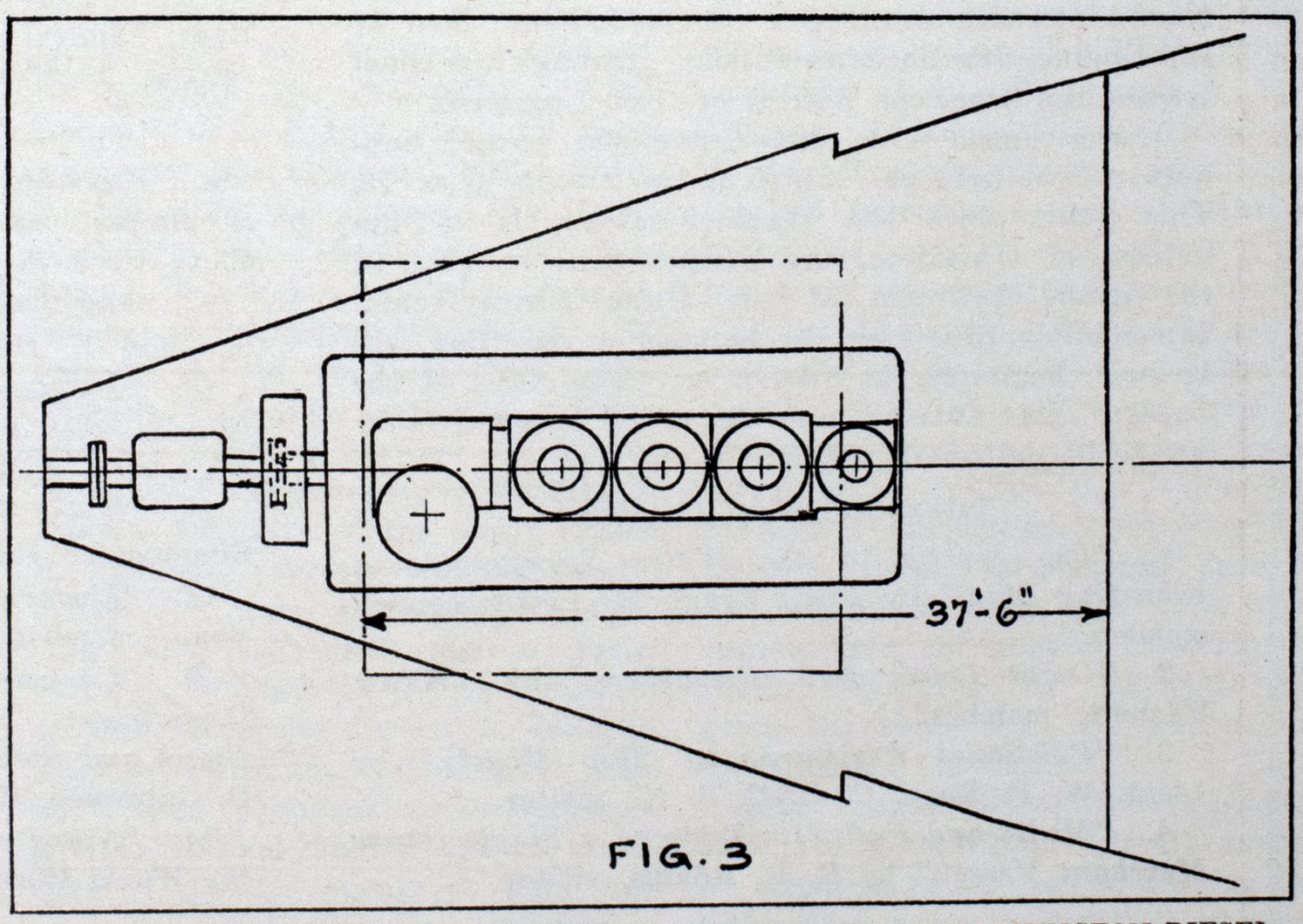


FIG. 3

FIG. 3—HULL OF FIG. 1 WITH 2500 H. P. DOUBLE ACTING WORTHINGTON DIESEL

the space required for 2500 horsepower installation of the three types of propulsion under consideration.

Fig. 1 shows a typical shipping board vessel with triple expansion engines and three scotch boilers of 180 pounds pressure. The length of the machinery space is 60 feet.

Fig. 2 shows the Hog Island "A" ship with a 2500 horsepower turbine double reduction gears and water tube boilers. Length of the machinery space is 49 feet 6 inches.

Fig. 3 shows the hull in Fig. 1 with a 2500 brake horsepower two-cycle double acting Worthington diesel engine. Ample space for auxiliaries has been provided forward of the engine and at the sides. The length of the engine room is 37 feet 6 inches. A Cramps four-cycle air injection engine has been installed, with ample clear floor space, in the space shown in Fig. 2. It is well known that the four-cycle engine requires more space than a two-cycle engine of the same power.

For steam engines and boilers, a canal size freighter requires a length of about 46 feet. A 700 brake horsepower diesel engine and auxiliaries can be installed in a length of 38 feet, and twin screw engines of the same total power in a length of 32 feet.

A saving in weight of machinery is more important than a saving in space. This is because the former permits greater cargo capacity, greater fuel carrying capacity, less draft or less displacement—whichever of these factors may be the most desirable. Steam engines with scotch boilers are well known to be the heaviest of all propelling systems. Their weight, depending on the auxiliaries required and including water in boilers and piping systems, is about 450 pounds per horsepower. The total weight of the 2500 indicated horsepower steam engine plant shown in Fig. 1 is about 500 tons. The reported weight of the 2500 shaft horsepower turbine installation shown in Fig. 2 is 460 tons or about 412 pounds per shaft horsepower.

The 2500 brake horsepower diesel engine plant shown in Fig. 3 has a total weight of 380 tons or about 340 pounds per brake horsepower. The weight of a two-cycle single acting or a four-cycle double acting engine probably would equal the weight of the steam turbine plant. The Cramps four-cycle engine replacing the turbine installation in Fig. 2, weighs 500 tons or about the same as the steam engine plant.

The weight of the machinery in a 700 indicated horsepower steam engined canal freighter is 170 tons. A close estimate of the weight of the machinery for a twin screw diesel engined freighter is 100 tons. This gives a greater carrying capacity of 70 tons on this account. Part of this saving is, of course, due to the higher speed of the diesel engines.

The largest crew is required for coal fired boilers, especially where coal has to be moved to the furnaces by coal passers. Oil practically has eliminated coal for large vessels. This is attributable to the elimination of coal passers and a reduction in the number of firemen in addition to other advantages. The fireroom crew of the installation shown in Fig. 2 consists of a fireman and a water tender per watch, or a total of six men. The engineering crew consists of one engineer and two junior engineers per watch, or a total of nine men. With the installation of the diesel engine, the entire fireroom crew is eliminated thus saving expense.

Naval Architects Meet in New York Nov. 14-15

THE thirty-seventh general meeting of the Society of Naval Architects and Marine Engineers will be held in the Engineering Societies building, 29 West Thirty-ninth street, New York city, Thursday and Friday, Nov. 14 and 15, 1929. Fourteen technical papers are scheduled for presentation at the professional sessions, which will begin each day at 10 a. m. The council of the society will meet prior to the general meeting at 3 p. m., Wednesday, Nov. 13, in the board room on the fifteenth floor of the Engineering Societies building, through the courtesy of the American Society of Civil Engineers.

In accordance with past custom the annual banquet will be held at 7:30 p. m. on Friday, Nov. 15. This year, since the Waldorf-Astoria is in the process of transition, the banquet will be held in the grand ballroom of the Hotel Pennsylvania. Immediately preceding the banquet a reception will be held, beginning at 6:30 p. m. The titles of the papers, their authors, and the order in which they are to be delivered, follow:

THURSDAY, NOV. 14, 1929

1. *"The Inertia of the Water Surrounding a Vibrating Ship,"* by Prof. Frank M. Lewis, council member.
2. *"Great Lakes Bulk Freighters,"* by William Bennett, member.
3. *"Frictional Resistance of Ship Models,"* by Lieut. W. P. Roop, C. C. U. S. N., visitor.
4. *"Model and Full Size Tests of a Single Screw Merchant Vessel,"* by R. R. Adams, visitor.
5. *"Model Results of a Four Bladed Propeller Series,"* by Rear Admiral David W. Taylor, C. C. U. S. N., retired, past president.
6. *"The International Conference on Safety of Life at Sea,* 1929, *with Special Reference to Ship Construction,"* by Rear Admiral George H. Rock, C. C. U. S. N., member.
7. *"The International Conference of* 1929 *and the New Convention for Safety of Life at Sea,"* by Rear Admiral John G. Tawresey, C. C. U. S. N., retired, member.

FRIDAY, NOV. 15, 1929

8. *"Corrosion Resisting Steel and Its Application to Ships,"* by Commander Harold E. Saunders, C. C. U. S. N., member.
9. *"The Colliers Berwindglen and Berwindvale,"* by John E. Burkhardt, member.
10. *"Increased Economy in Marine Steam Machinery with Particular Reference to Marine Boilers,"* by J. H. King, member.
11. *"Trial Trip Data of the Saratoga,"* by Lieut. Commander James T. Alexander, U. S. N., visitor.
12. *"Modern Turbine Propulsion,"* by W. E. Thau, member.
13. *"Comparison of Operating Costs of Engine Departments of United States Shipping Board Diesel and Steam Cargo Vessels,"* by Capt. Richard D. Gatewood, C. C. U. S. N., retired, member.
14. *"Notes on Work of Great Lakes Shipyards in the World War,"* by Henry Penton, council member.

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Golden Triangle—Pittsburgh—Steel Industry Center—Confluence of Monongahela (right) and Allegheny (left) to form the Ohio

Open Ohio River with 9-Foot Stage All Clear—Pittsburgh to Cairo

By W. G. Gude

A NUMBER of steamers, bearing business leaders and government officials, formed in the Pittsburgh harbor on Oct. 19 and started down the Ohio with Cairo, Ill., 968 miles away, as the ultimate destination. This voyage, following a large parade of river craft in the harbor the preceding day, commemorated the completion of a huge undertaking, a project that occupies a prominent position in the development of inland river transportation—the canalization of the Ohio river with a nine-foot stage from its origin at Pittsburgh to its mouth near Cairo where it empties into the Mississippi river. This great roadway now is ready to return to shippers dividends on the $125,000,000 and many years of labor expended in the construction of its 49 locks and dams and navigable channel.

The event was marked by appropriate exercises at Pittsburgh, where members of the Ohio Valley Improvement association met with government, state and business executives to celebrate the realization of the slogan "On to Cairo" which for years has been the byword of this group in its work to further Ohio river transportation. Secretary of War James W. Good was the principal speaker at a banquet attended by 1200 persons in the William Penn hotel Thursday evening, Oct. 17. Other speakers included Andrew W. Mellon, secretary of the treasury; Charles F. Adams, secretary of the navy; Robert P. Lamont, secretary of commerce; James J. Davis, secretary of labor; John S. Fisher, governor of Pennsylvania; William G. Conley, governor of West Virginia; Ernest L. Jahncke, assistant secretary of the navy; Daniel Willard, president of the Baltimore & Ohio railroad; John J. Bernet, president of the Chesapeake & Ohio railroad; Patrick E. Crowley, president of the New York Central lines; Gen W. W. Atterbury, president of the Pennsylvania railroad; Frank E. Taplin, president of the Pittsburgh & West Virginia railroad. A suggestion by James Francis Burke, toastmaster that an American council of transportation be created was warmly approved by attending rail executives.

From Pittsburgh, the river parade proceeded down the Ohio, stopping at various towns and cities en route, to Cincinnati where a celebration under the direction of the Ohio Valley Improvement association, with President Herbert Hoover as principal speaker, was scheduled to be held. The association held its regular meeting en route. Following the Cincinnati program the boats were to continue on their journey to Cairo.

Approximately 50 years have elapsed since the government actively turned its attention to the task of making the Ohio river a great roadway of com-

merce. Considerable of the delay encountered in this work may be accounted for by the limit appropriations available and by the fact that construction was possible only during low stages of the river, a condition prevailing usually from July to November. In 1825 the Kentucky legislature empowered a stock company to construct a canal around the falls of Ohio, with suitable locks, docks and basin. This work was completed five years later. Three locks of equal lifts were built in the canal at the western end, each chamber having a width of 50 feet and a usable length of 185 feet. The federal government The canalization project, instituted with the construction of this first lock and dam, proposed to maintain a depth of only six feet over a distance of 90 miles. This plan later was altered to provide a depth of nine feet with 49 locks and dams over the entire length of the river—the condition that now exists. Each dam has a lock chamber 110 feet wide with 600 feet available length.

Prevent Increase in Flood Height

To permit open river navigation when the natural depth is 9 feet or more and to prevent any increase in flood height, all the dams except the one immediately below Pittsburgh are of the movable type. The latter replaces original dams No. 1 and No. 2. Navigation passes through a pass from 600 to 1248 feet wide in the movable dams. This section consists of a series of wickets, 3 feet 9 inches wide and 16 to 20 feet long, each supported in an inclined position by a prop. The dam is lowered by means of a derrick boat which releases the props and permits the wickets to be lowered so as to lie flush with the bottom of the river.

The cost of the lock and dam construction just completed was about $110,000,000. Building the Louisville and Portland canal cost $5,360,000, while channel improvement work involved $11,000,000, or an aggregate of $126,360,000. In improving the Monongahela river, the chief tributary of the Ohio, $13,200,000 was spent. The Allegheny river improvement work cost $7,200,000 and other tributaries $38,000,000. The cost of operating and maintaining Ohio river locks and dams is estimated at $2,250,000 annually, with the maintenance of the channel an additional $500,000. The gross savings in river transportation as compared with rail charges in recent years have offset by a substantial margin the fixed charges incident to the large investment in river construction. The annual net saving on the Ohio river system is estimated at about $15,000,000. The war department states that the Monongahela river improvement has paid for itself and has earned a surplus of about $100,000,000, returned to the general wealth of the nation through reduced transportation costs.

Preparing a route from Pittsburgh to the Mississippi river enhances the value of important tributaries of the Ohio, although considerable of the traffic on these branches is localized. On the Monongahela, for example, the bulk of the traffic is in coal destined for and carried by Pittsburgh steel producers. In 1928, traffic on the Monongahela amounted to 27,412,143 tons, compared with 20,938,267 tons for the Ohio proper and 57,827,861 tons for the entire Ohio system.

The movement over the Ohio has fluctuated considerably over the past 75 years, due to several factors. Railroad construction during the middle of the nineteenth century provided a competition that took a large portion of the flourishing business formerly enjoyed by packet operators. From about 1875 to 1904 shipments of coal from the upper Ohio to the lower Mississippi expanded markedly, but the development of coal fields in western Kentucky and Alabama at the beginning of the current century restricted the movement from that time onward. Work on lock and dam construction became more concentrated about 1910, interfering with transportation and resulting in a decline in traffic from about 13,000,000 tons in 1905 to about 4,600,000 tons in 1917. The latter year marked the low point, and the total for 1928 represents an increase of nearly 400 per cent for the 11 years.

Carrying Capacity Greatly Increased

Use of the Ohio river still is well below its estimated capacity, and its potential carrying abilities can be greatly increased by additional dam construction. Its width varies from less than 900 feet in its upper reaches to nearly 6000 feet near its mouth, and its slope varies from 11½ inches per mile in the upper reaches to 3 inches per mile near the mouth. The slope of the river is fairly uniform with the exception of the break at the Falls of the Ohio at Louisville, where there is a low-water drop of 26 feet in a distance of two miles.

It is natural to expect that future years will witness an upward trend in river tonnage figures, although as frequently pointed out by authorities considerable work remains to be done in the construction of adequate terminals in order to provide small shippers the facilities now enjoyed by large companies through their private docks. On the Allegheny river from Pittsburgh to New Kensington, Pa., there are 34 terminals, all private, used for loading and unloading barges. On the Ohio river from the point at Pittsburgh to Woodlawn, Pa., there are 31 private terminals, none of which are public. There are 39 private and 2 public terminals on the Monongahela river up to Clairton, Pa. The latest development in this connection is the application by the Mississippi Barge Line Co., a $3,000,000 organization, for a certificate from the interstate commerce commission under the Dennison act. This act permits the commission to establish joint river and rail rates. The Mississippi line proposes to establish a common-carrier barge service between Cincinnati and New Orleans and recently placed orders for five towboats and 50 barges for this service.

President Hoover Speaks

PRESIDENT HOOVER, in his address at Louisville, Ky., Oct. 23, on the occasion of opening the 9-foot channel of the Ohio river from Pittsburgh, Pa. to Cairo, Ill. outlined the policies of his administration in the development of waterways, which we abstract as follows:

Modernizing all waterways which show economic justification. A 9-foot depth should be established in the remainder of the Mississippi trunk system, and in the tributaries, for the time being, a depth of 6 or 7 feet. The transportation system should be extended outward from the main trunk line. Government barge lines must be continued through the pioneering stages but with a view ultimately of private initiative. The entire Mississippi system should be completed within the next five years.

Having completed 746 miles of intracoastal canals, there is still approximately 1000 miles yet to build, which should be completed within ten years. Improvement of the channels should continue, and the works necessary for stabilizing the levels of the Great Lakes should be built.

A waterway for ocean going vessels through the St. Lawrence inward to the Great Lakes is one of the most vital improvements to transportation on the North American continent and all obstacles to this end should be overcome. After having disposed of electrical power it would be possible to carry out the entire construction for less than $200,000,000 divided between the two governments and spread over a period of ten years.

Harbors and the littoral waterways extending inland from them must be unceasingly maintained to serve the increasing size of ocean going vessels and expanding volume of commerce.

Total construction of the projects mentioned amounts to three or four times that of the Panama canal.

British Shipping Is Quite Active

Future Prosperity—Shipyards Fairly Busy—Number of Foreign Orders—Shipping Conditions Irregular—South American and Far East Trade Good

By Vincent Delport

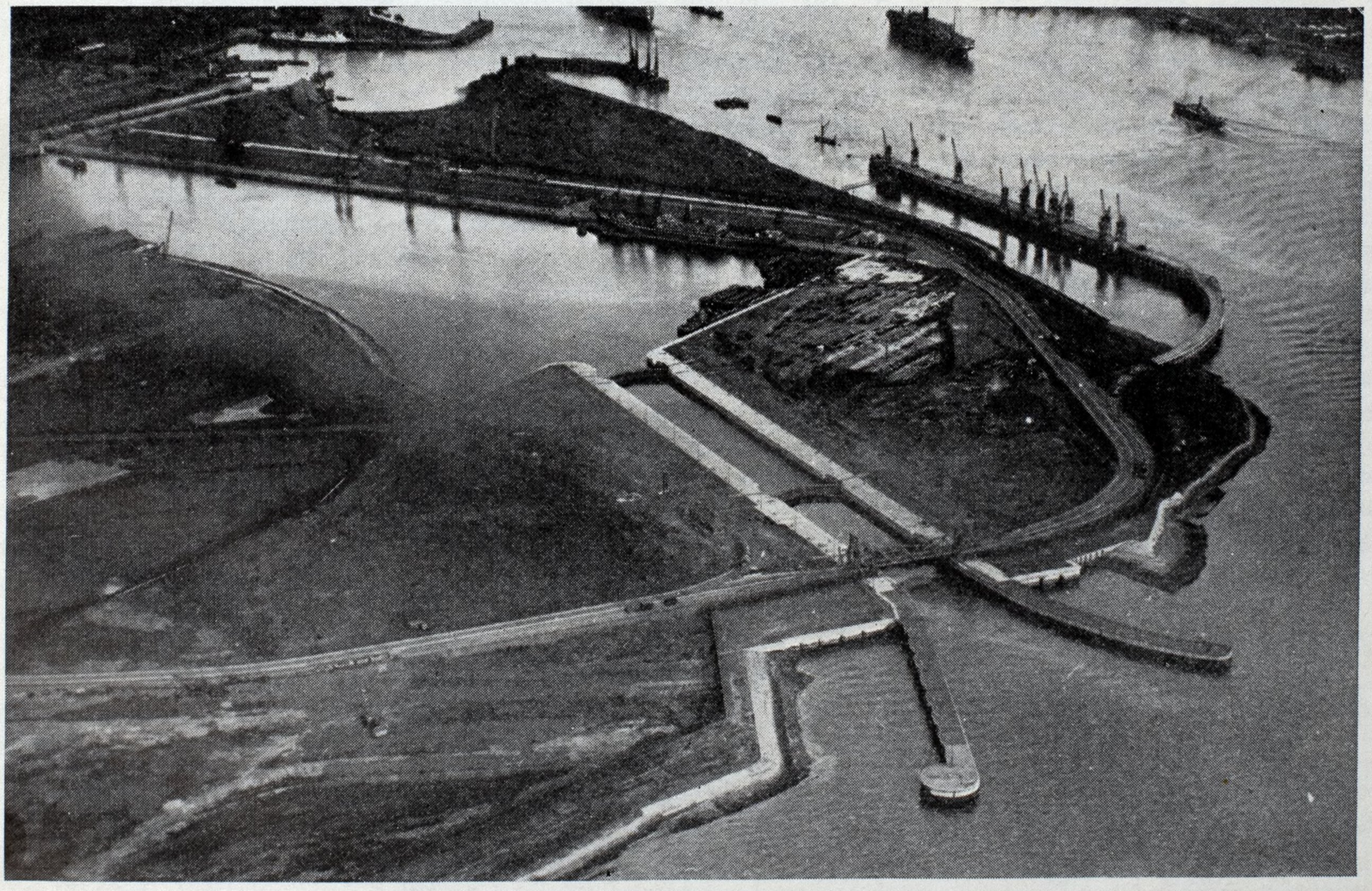
European Manager of Marine Review

SIGNS of improvement in the British shipping industry have recently been forthcoming. It was stated at a meeting of the Tyne commission, about the middle of September, that there were practically no vessels laid up in the river at that time. The annual report of the port of Bristol indicates that despite the financial depression during 1928-29, the port has maintained its relative position in the import and export trade. On the other hand, the owner's standpoint, as expressed by Sir Frederick Lewis, chairman of Furness, Withy & Co., does not reflect much optimism. Speaking at the annual general meeting, which was held in midsummer, Sir Frederick said that the trade of the world has not yet caught up with the excess of construction in later years. After stating that he was frankly uncertain about the outlook, he added that one thing is reasonably certain; given a period of undisturbed tranquility, trade should develop and expand, and shipping again should see prosperous times.

Among owners of general trading companies there seems to be a divergence of opinion with regard to the future, for some firms are placing orders for new vessels, some of which are repeat orders, while others have not placed a single contract for a long time. While the shipyards have had a fairly active time this year, at least relatively to the period of depression of the past years, it must be borne in mind that a substantial tonnage of orders is of foreign origin. There are, of course, numerous contracts coming from domestic companies, but there is a feeling in certain quarters that new construction programs are reaching their culmination point.

While reports from the principal shipbuilding centers have been to the effect that the shipyards were fairly active, launching statistics show that for the first eight months of the year the total tonnage launched was less than in the corresponding period of last year. However, the August launchings on the Clyde were the largest for the year with the exception of March, when 17 vessels, totaling 48,414 tons, were launched. For the eight months of the year the total was 150 vessels, of 372,753 tons, less by 43,450 tons than the tonnage launched in the corresponding period of last year. In September this year there was a sharp decline, the total of 10 vessels, of 27,968 tons, being the smallest for some months. On the Tyne, the figures for the period ending Aug. 31 this year were 41 vessels, of 156,009 gross tons, as against 51 vessels, of 212,293 tons, in the eight months ending Aug. 31, 1928.

Among contracts of particular inter-



Improvement and Extension of Facilities at Tilbury recently opened by Port of London Authority. Entrance Locks Leading to Dry Dock. Beyond to Right is Floating Landing Stage. Dry Dock Will Take Largest Ships.

est recently booked is a passenger and fruit-carrying boat placed with Workman, Clark (1928) Ltd. by Vaccaro Bros. & Co., New Orleans, who are closely identified with the Standard Fruit & Steamship Corp. The vessel will have an extensive refrigerating plant, and will be about 380 feet long, with a gross tonnage of over 4000 tons. An order for a similar steamer has been placed with Barclay, Curle & Co. Ltd., Glasgow.

The outstanding event at Belfast during August was the launch of the White Star motor vessel BRITANNIC, by Harland and Wolff, which was reported in MARINE REVIEW of September. Workman, Clark (1928) Ltd. completed on July 30 the official trials of the whaling factory ship KOSMOS, of 32,000 tons, 570 feet in length, 77 feet in breadth and 50 feet 6 inches in depth. The whaling factory is situated in the upper 'tween decks, and is equipped with the latest machinery for the economical extraction of oil from the maximum catch of whales.

On Sept. 5 the same builders launched the LINDENBANK, the fourth of the eight vessels which they have on order for Andrew Weir & Co. for the services of their Bank line. The vessel is of the shelter deck type built to Lloyd's highest class, her dimensions being: Length, 436 feet; beam, 56 feet; depth to shelter deck, 36 feet 3 inches; the displacement is about 13,000. There are five cargo holds. The propelling machinery, constructed by the builders, consists of direct-acting inverted quadruple-expansion engines, having cylinders 22, 32, 46¾ and 68 inches with a stroke of 48 inches, steam superheated to 90 degrees being supplied from three cylindrical boilers 15 feet 6 inches diameter by 11 feet long, with a working pressure of 260 pounds per square inch, fitted with Howdens forced draft.

On the river Clyde, the prospects for a continuance until the end of the year of the moderate activity that has been prevailing during the past nine months are fairly good. New contracts, however, are scarce. There have been comparatively few orders for large vessels during the past three months. The Greenock Dockyard Co. obtained a contract for a cargo steamer of 9400 tons deadweight for A. Melville Dollar, Vancouver, B. C.; the machinery will be constructed by David Rowan & Co., Glasgow. Scott's Shipbuilding and Engineering Co., Greenock, have an order for two diesel-electric oil tankers, each of about 8950 tons gross, from the Atlantic Refining Co., Philadelphia. These vessels will be practically duplicates of the BRUNSWICK, built last year for the same owners, and the diesel engines again will be supplied by Carels Freres of Ghent, Belgium, and the electrical gear by the British Thomson-Houston Co., Rugby. The builders of these ships now have more than a dozen vessels on their books, including four Holt Line motorships, a number of vessels for Brazilian owners, and the two diesel-electric ships mentioned above.

In the Newcastle-on-Tyne district, Sir James Laing & Sons, of Sunderland, received early this summer an order for a 10,000-ton tanker for John J. Jacobs & Co. Ltd., of London. At Smith's dockyards, North Shields, 27 whaling boats are being built, or being fitted out, while two Royal Mail steamers are being converted into floating whale factories. When work in hand is completed, their total of whaling ships for the year will be 35. Sir W. G. Armstrong, Whitworth & Co. Ltd., have booked further orders for two 9000-ton motor ships for Norwegian owners. Hawthorn, Leslie & Co. Ltd., Hebburn, have secured a contract from France, Fenwick & Co. for a self-trimming collier, 306 feet in length, while Wm. Doxford & Sons Ltd., Sunderland, are to build a vessel of about 7000 tons for London owners.

Palmer's Shipbuilding & Iron Co. Ltd., of Jarrow-on-Tyne, is reported to have obtained an order for a motor ship of 10,000 tons for British owners. In the Newcastle district there also have been several important contracts for ship repairing, but competition is keen, as there still is a shortage of this class of work among local firms.

Conditions in the shipping market have been irregular of late. The monthly review of the Midland Bank Ltd. for September states: "The settlement of the labor troubles in the River Plate was welcomed by owners, but serious congestion has occurred there, and it is likely to be some time before normal conditions are once more actually restored. The situation has been eased by the diversion of tonnage from the Plate to the nitrate coast, resulting in easier terms for the latter."

With respect to freight rates, the accompanying chart of index numbers, compiled from *The Statist*, London, shows that freights reached their lowest point for the year in June, since when there has been a very slight upward tendency. For July the index was the same as in July, 1928, but the figure for August was not equal to that of last year. At the end of September the markets were irregular and somewhat disappointing. There were, however, a few bright spots, homeward business from the River Plate expanding in volume, although rates did not strengthen. The North American markets have been dull, but hopes are entertained that chartering will revive in order to take care of the larger surplus of grain that has been accumulating. Ore chartering is developing, and outward coal is fairly active. The Far Eastern markets are fairly busy.

The average rates in representative lines at the end of the third quarter of the year are as follows: Montreal grain for the Mediterranean at 14 cents. River Plate to United Kingdom or the continent, about 17s. Scrap iron from the Plate to Glasgow, about 25s. Iron ore, Bilbao to Glasgow, 8s 3d. Coal, South Wales to Buenos Aires, about 16s 6d; Wales to Alexandria, 10s 3d.

The question of greater port facilities is being actively taken up by the British chamber of shipping through its Port Facilities committee. Two subcommittees have been appointed, one to concern itself with the main overseas ports of the country, and the other to consider the small ports.

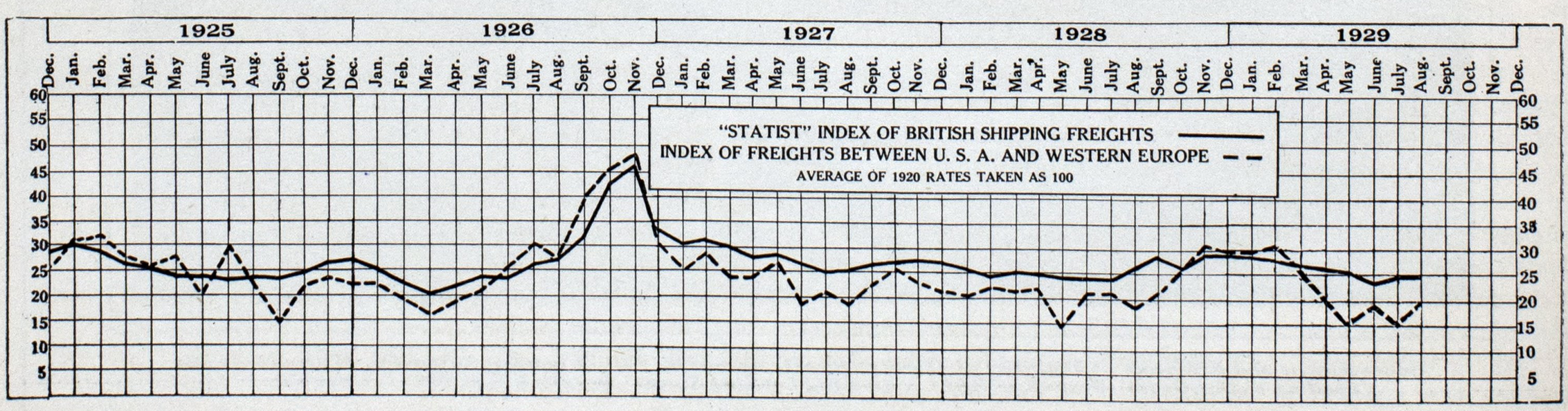
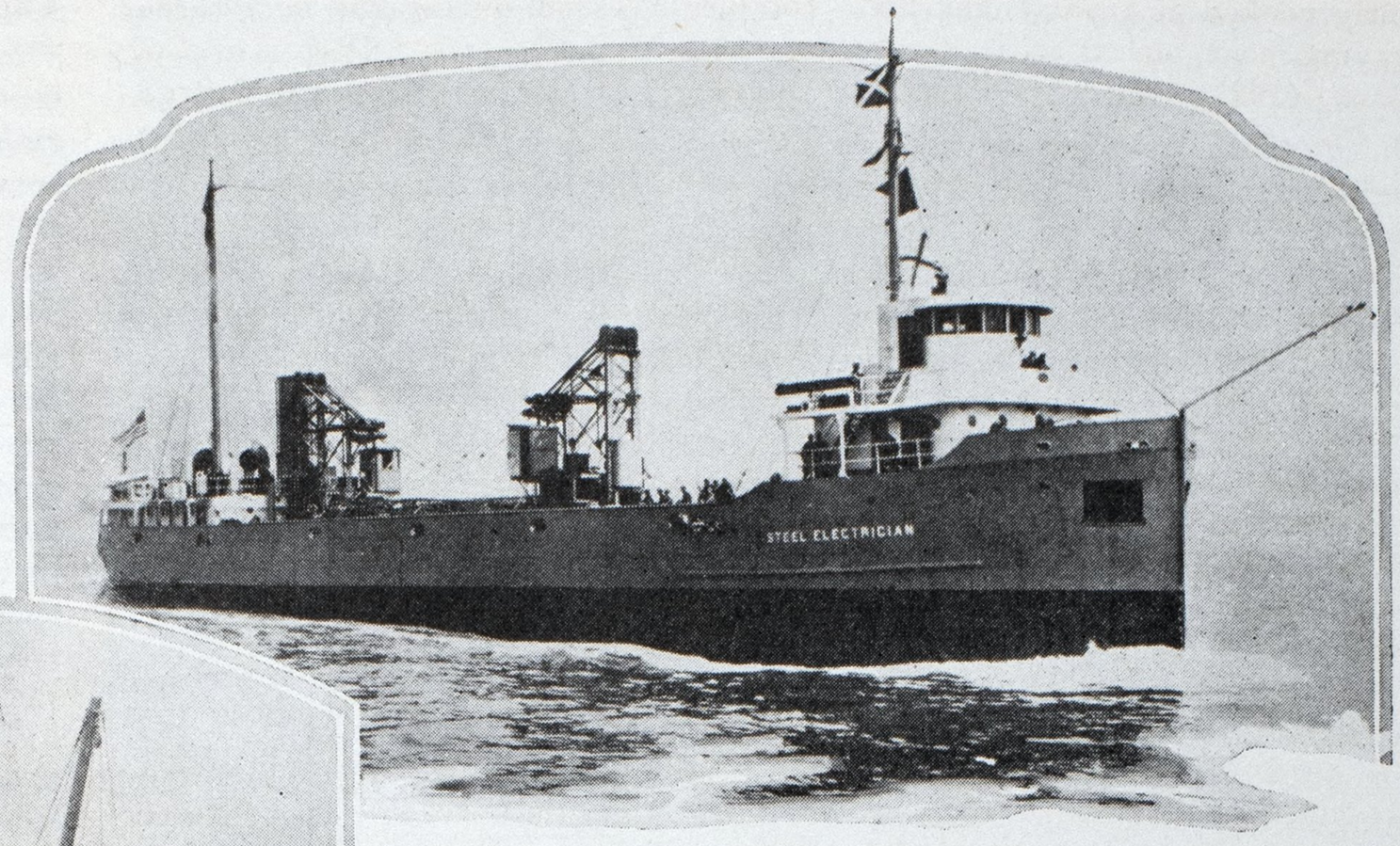
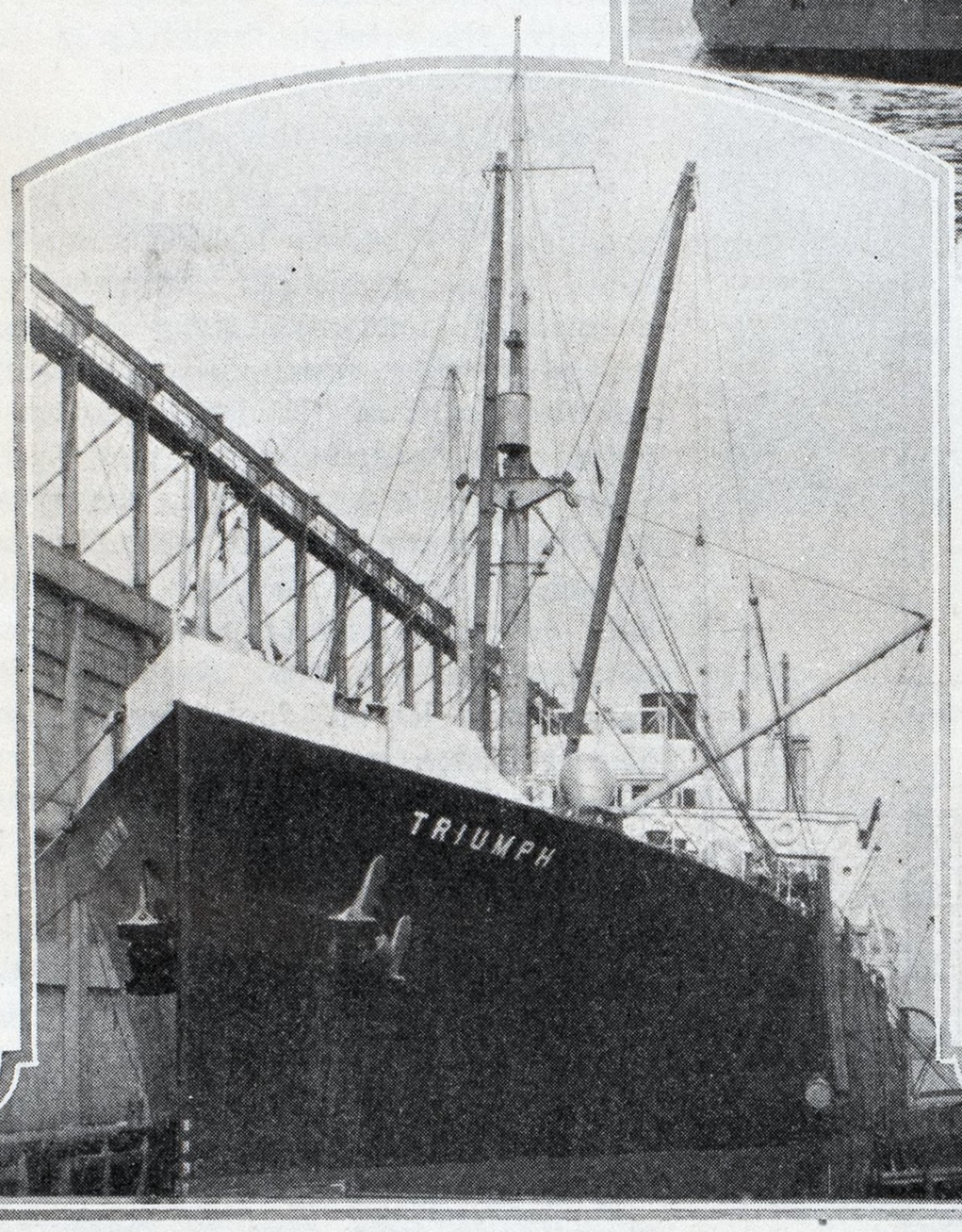


DIAGRAM SHOWING FLUCTUATION OF FREIGHT RATES FOR FOUR YEARS AND EIGHT MONTHS



BELOW — The Diesel Electric Ocean Going Cargo Vessel Triumph on Loading Berth at the Brooklyn, N. Y. Docks of the Roosevelt Steamship Line.



ABOVE — Steel Electrician, Diesel Electric Cargo Vessel for Great Lakes and St. Lawrence Service.

Diesel Electric

Is Reliable—Flexible and Economical

By H. C. Coleman

THE fast, modern motorship is rapidly supplanting the usual slow tramp steamers of other years. It is becoming more widely recognized that the cargo ship of the future must make better speed than those of the past, in order to successfully compete with foreign shipping. Let us not forget that in order to build up an adequate merchant marine, we must provide, not only large combination passenger and cargo liners, but also fast, economical, modern freighters. It is of interest and value to consider how the diesel electric system of propulsion may be utilized to advantage in the powering of such cargo ships as those referred to above.

The favored layout of diesel electric drive for a cargo vessel of say 10,000 tons would consist of three or four, preferably four, main engines of moderately high rotative speed, each driving a main direct current, shunt wound generator of sufficient capacity to absorb the full output of the engine, and an exciter, the capacity of which would be determined by the total auxiliary power and excitation load at sea and the number of units; a double unit propelling motor direct connected to a single screw; and a suitable switchboard and control equipment. The scheme of connections and control is, as has been explained in previous articles, extremely simple. The main generator armatures are connected in series with the propelling motor armatures by means of simple set-up switches. The motor fields are connected directly to a constant voltage excitation bus arranged to be energized from any one of the exciters. The generator fields are connected in parallel through a controller to the same excitation bus. This controller varies the voltage impressed on the generator fields in steps from full value in one direction to full value in the reverse direction, and hence controls the speed and direction of rotation of the propelling motor. One of these simple controllers is installed on the bridge, and a duplicate is mounted in the engine room at the main switchboard with a transfer switch to connect the control to one station or the other. On such an installation, the current to be handled in the controller would not be more than about 100 amperes, so that it is very small, simple and reliable.

The primary advantages of this form of propulsion for cargo vessels, as compared with direct diesel drive, may be enumerated as follows:

1. Affords reserve power, operating flexibility and reliability.
2. Provides flexibility in arrangement.
3. Provides for power for auxiliaries at sea and in port, from main engines.
4. Allows use of most efficient propeller speed.
5. Indicates increased life of engines.
6. Less total weight.

The author, H. C. Coleman, is manager of the Marine Engineering department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This article was prepared at the request of the editor.

7. Affords refinement in control.

8. Enables power records to be readily made.

Each of these primary advantages will now be considered one by one, in detail.

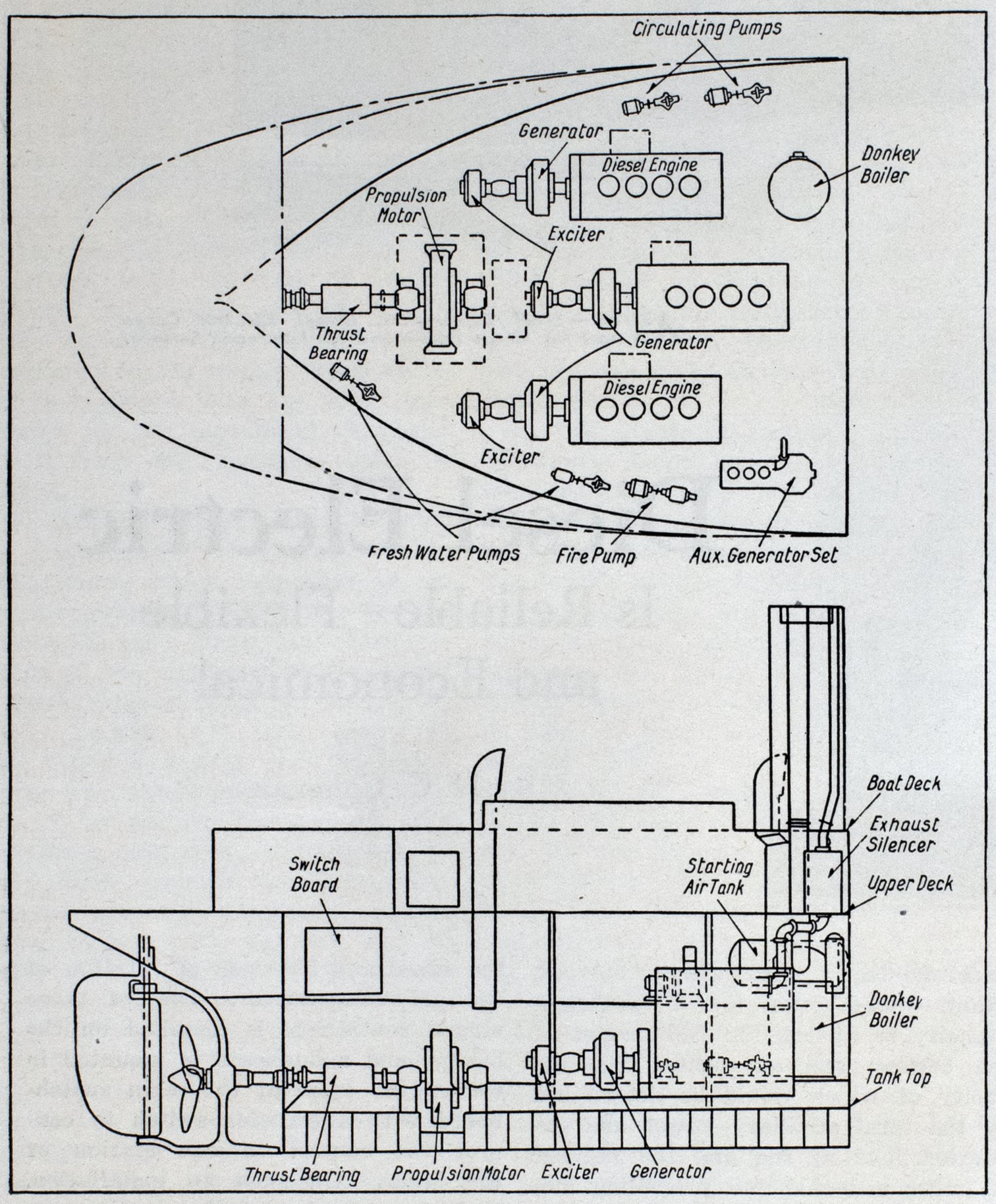
Assuming an installation of four main engines, the following ship speeds may be maintained, with various numbers of engines operating, based on the power varying as the cube of the speed:

4 Engines 100 per cent ship speed
3 Engines 91 per cent ship speed
2 Engines 79 per cent ship speed
1 Engine 64 per cent ship speed

The electrical system is such that corresponding full power may be obtained from the units in operation. Obviously, this arrangement gives the utmost in reliability and reserve power. A unit may be shut down, repairs made, and put back in operation without seriously affecting the schedule of the vessel. This distinct advantage is available with no other system. With such a propulsion plant, it is hard to conceive of a ship ever being completely disabled.

The diesel electric drive represents the maximum in flexibility of engine room arrangement. There being a multiplicity of units with no connection to the propeller shaft, they may be placed to the best advantage as regards accessibility, economical use of the available engine room space, distribution of weights, and simplification of foundations. In the example under consideration, the four main generating sets may usually be located abreast of each other at the forward end of the engine room with generators aft and the propelling motor in the after end of the engine room and the switchboard on a flat above the motor. This provides short cable leads and simple wiring. There is plenty of space for the engine room auxiliaries beside the outboard engines and on both sides of the main motor.

With diesel electric drive, the layout is conveniently made such as to provide for supplying all power necessary for auxiliaries and lighting when under way from the exciters. This power is thus supplied at the economical fuel rate of the main engine and no auxiliary diesel generating sets have to be supplied or operated. Of course, a small emergency auxiliary set must be carried and this may be used when the vessel is in port and not handling cargo. The electrical arrangement is such that any main generator may be used in port for supplying power to the electric cargo handling equipment. This further illustrates the extreme flexibility of this type of drive.



ENGINE ROOM MACHINERY LAYOUT ON THE STEEL ELECTRICIAN

Most Favorable Propeller Speed

The diesel electric drive imposes no practical limitations on the propeller speed to be used, and eliminates all compromise between propeller and engine speeds which always exists on direct drives. A low speed propeller is fundamentally most efficient. With electric drive, the speed may be made that of the most efficient propeller design for the particular ship involved with consequent minimum power required to drive the vessel and lowest fuel consumption. The reduction in power from that required with the higher speed direct drive because of the difference in propeller efficiency in conjunction with the saving effected by taking all auxiliary power from the main engines will, in most cases, more than offset the electrical losses in the generators and motors. Furthermore, the full load motor speed may be adjusted within reasonable limits, by means of its field rheostat to take care of inaccuracy in propeller design, changed draft, or other conditions. This is not possible with any other form of drive without sacrificing a part of the power. This is another example of the flexibility of this system.

The electric drive engines are simpler than those of the direct drive because they are non-reversing. They are smaller with lighter parts, easier to handle, repair and maintain. Taking all this into account, and also the easier service conditions of the electric drive engine which does not have to undergo the shocks incident to rapid reversing and maneuvering and frequent starting, it would seem that the electric drive engine would have the longer life, or, with equal life, should require less maintenance.

Careful analyses, taking into account all items affected, have shown appreciable weight savings with the electric drive which can be evaluated in terms of increased revenue from additional cargo carried. The space required for the diesel electric plant is usually the same as, or slightly less than for direct drive. The electric

drive engines require much less headroom.

Extreme refinement of control is obtained with the electric drive. Complete control of the propeller is placed in the hands of the pilot, thus eliminating mistaken signals and hence increasing the safety of the vessel and minimizing damage charges. Bridge control saves time and allows the engineer to devote his energies toward keeping his machinery in good operating condition. While this item is not of as much importance in the case of a sea-going cargo vessel as in lake, canal and coastwise freighters, it must be given due consideration.

Accurate Records Obtainable

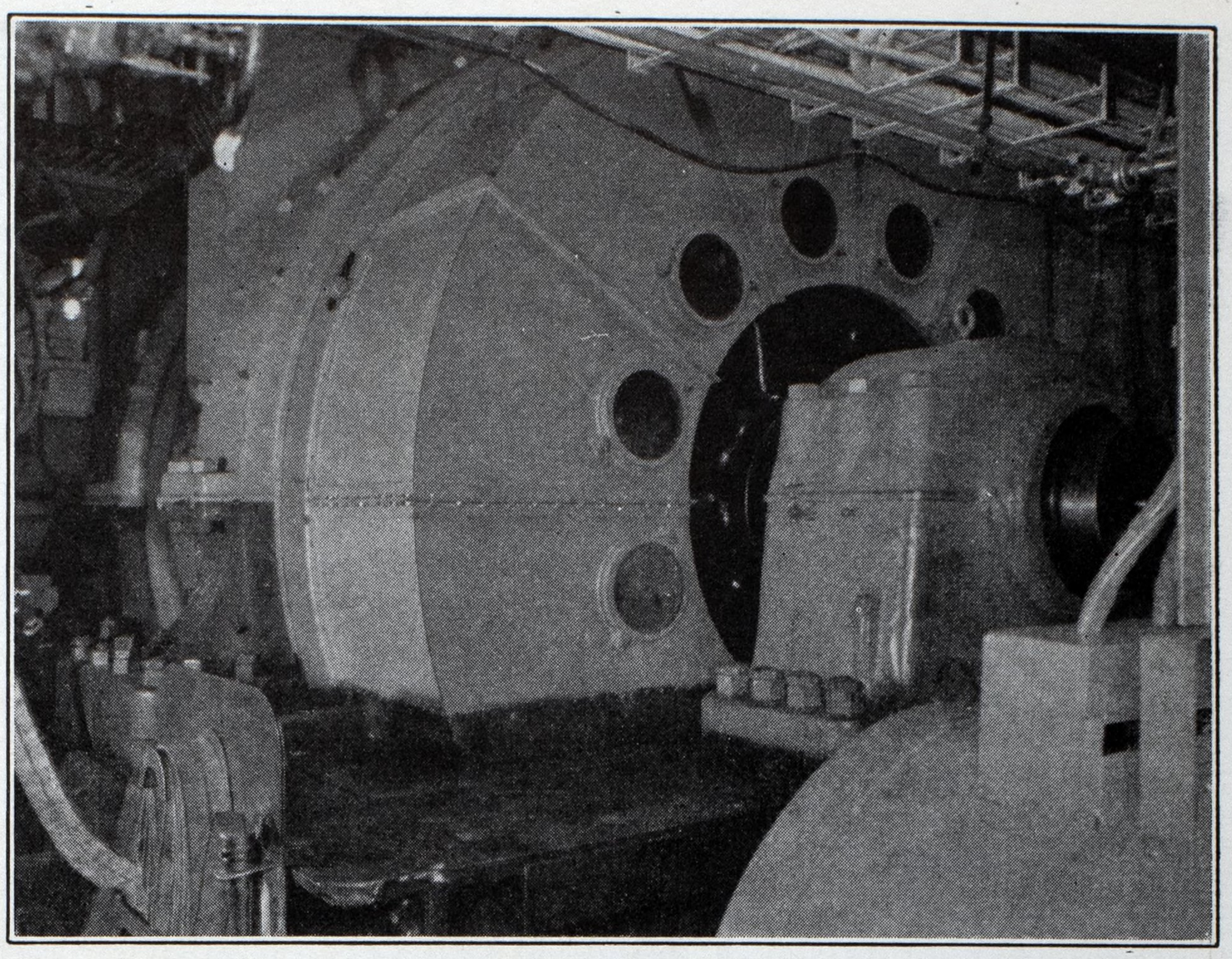
Accurate records of power are readily obtained with the electric drive. The electrical instruments enable the engineer to keep a close check on the operation of his engines, so that he is in a position to make minor adjustments and repairs promptly and thus prevent serious troubles which might otherwise result. This tends toward low maintenance and good operation.

The most recent examples of modern cargo vessels fitted with this type of propulsion are the shipping board vessels TRIUMPH, DEFIANCE and COURAGEOUS which were 9.5 knot, 10,000-ton steamships, and were converted to fast motorships, by altering the bow and stern shapes and increasing the propulsion power. Each of the first two of these vessels is fitted with a 4000-horsepower, 60 revolutions per minute, Westinghouse propelling motor supplied with power from four 800-kilowatt, McIntosh & Seymour diesel engine generator units. The third vessel is fitted with the same diesel engines but with General Electric generators and motor. Each engine also drives a 100-kilowatt exciter.

In the selection of the type of drive, such factors as weight, cost, space and fuel economy were considered. An analysis of power requirements based on tank tests showed that with a propeller speed of 60 revolutions per minute, more than 13 knots could be obtained with diesel electric propulsion with a total of 4950 brake horsepower for all purposes.

This would permit the use of 4500 brake horsepower for a 4000 shaft horsepower propelling motor with 350 brake horsepower for auxiliaries, which would be ample for sea requirements.

The installation of diesel electric equipment could be accomplished in the original engine room and boiler room spaces, thereby saving the full cargo capacity of the vessel which could not be done with direct diesel drive. Also, with direct diesel drive, more structural changes would have been necessary for engine foundations and considerable more power required, due to a higher propeller speed with resultant loss of efficiency.



THE 4000 SHAFT HORSEPOWER DOUBLE ARMATURE PROPELLING MOTOR OF THE DIESEL ELECTRIC FREIGHTER DEFIANCE

A comparison of the total weights of diesel electric and direct diesel installations showed a saving of about 170 tons in favor of the electric drive, a factor of considerable importance in freight revenue on the Far East trade route for which these ships were converted.

The first cost was in favor of diesel electric propulsion due largely to the saving in power requirements over direct drive, because of the improved efficiency of the propeller at 60 revolutions per minute. A study of operating costs, taking into consideration such factors as maintenance, difference in power, taking auxiliary power from main engines, and running at reduced speeds, also showed electric drive to be more economical than direct diesel for these vessels.

An example of the modern small cargo carrier is the United States

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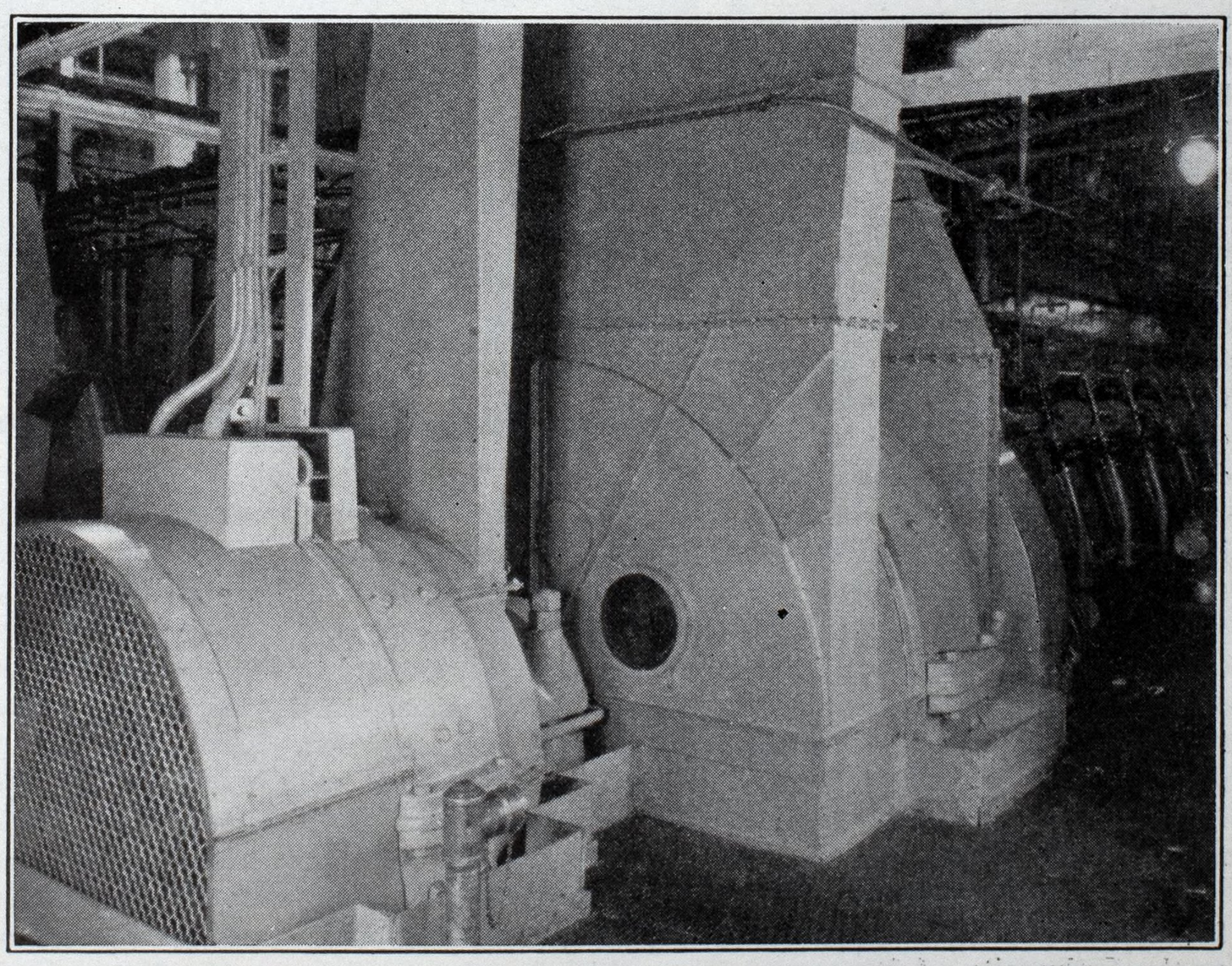
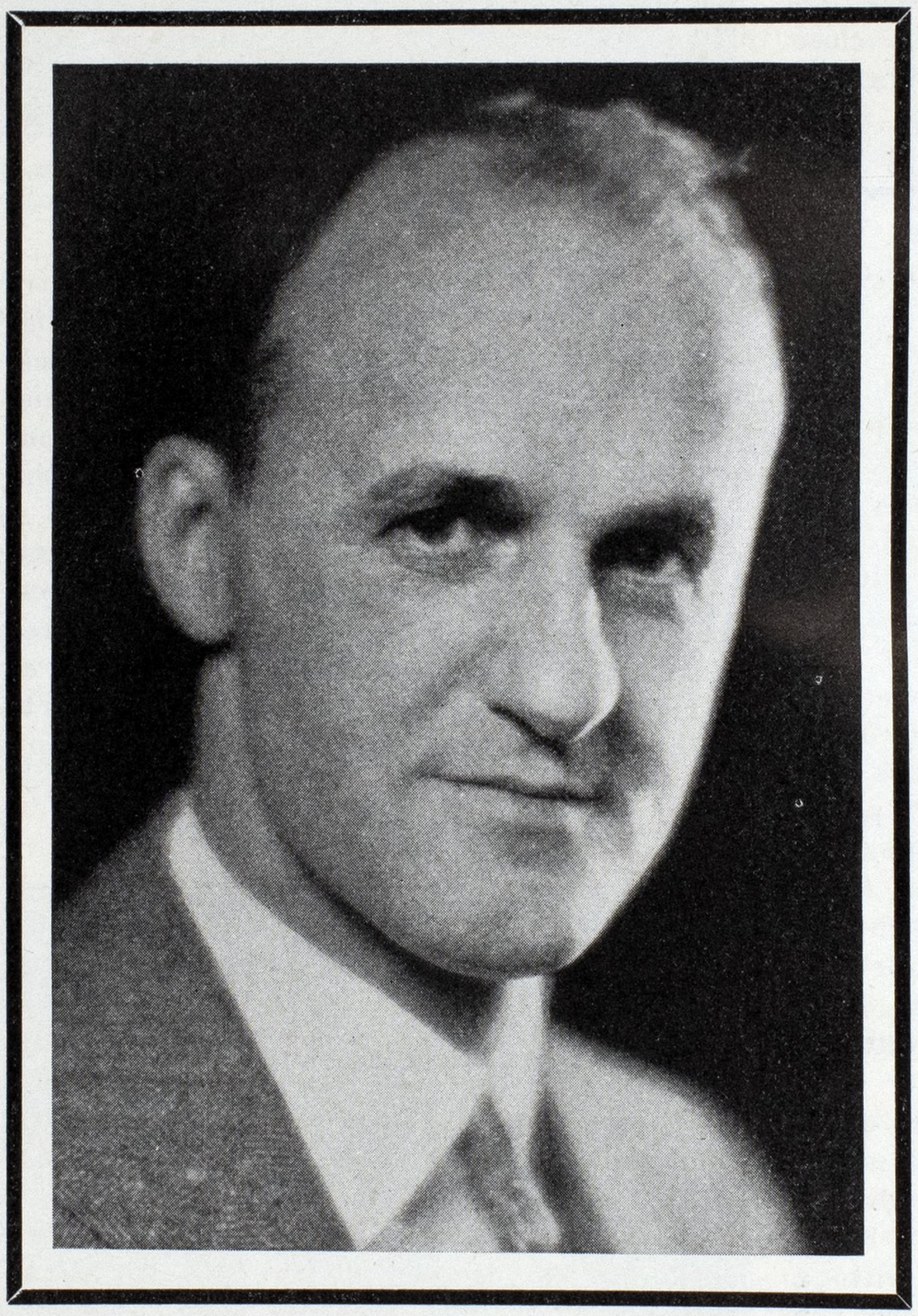


ONE OF THE FOUR MAIN GENERATORS ON THE DIESEL ELECTRIC FREIGHTER DEFIANCE. ONE OF THREE SHIPPING BOARD VESSELS CONVERTED

1886 H. Cole Estep 1929

H. COLE ESTEP, vice president of the Penton Publishing Co. and former editor of MARINE REVIEW, died suddenly of heart failure in Cleveland on Sept. 30 as he was about to enter the Penton building, in which his offices were located.

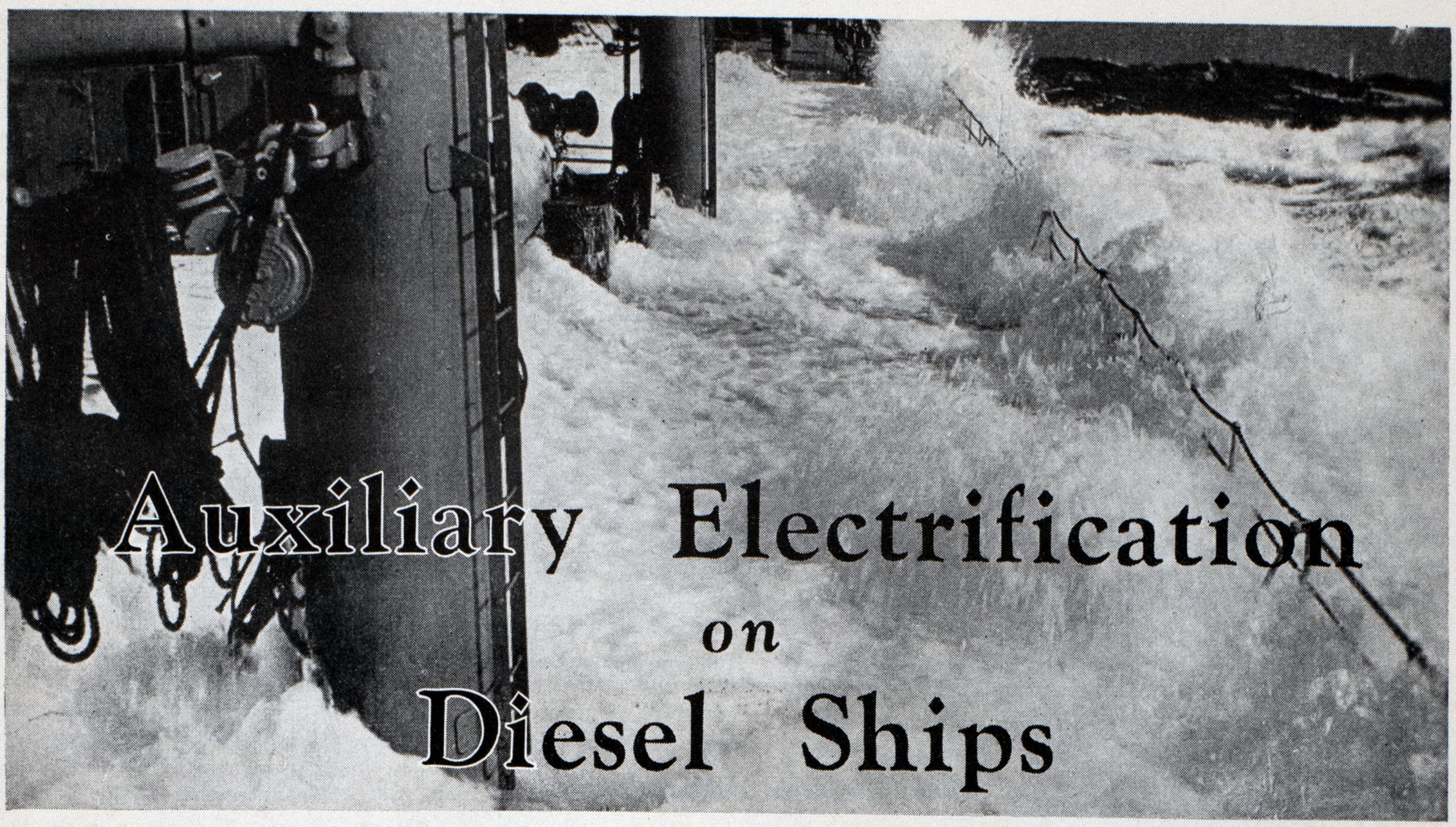
Mr. Estep occupied a place in the front rank of industrial publishers, being actively identified with the technical publishing field both in this country and England. He joined the Penton Publishing Co. in 1908 and served in various capacities until 1919, when he was sent to Europe to establish offices for the company in England, France and Germany, remaining as European manager until 1924. As editor of MARINE REVIEW from 1916 to 1919, Mr. Estep's efficient work in the marine field was of far-reaching effect. He realized the importance of a business publication in time of war, and as shipbuilding soon became the very cornerstone of American war policy, he exercised a steadying influence in the trade by publishing accurate and helpful information at a time when it was greatly needed. Among the big things undertaken along this line during the war was the presentation of a series of articles on how to build wooden ships; the publication of details of the remarkable feat of repairing the machinery of the interned German ships; a complete treatment of the country's great steel shipbuilding program, including the Great Lakes division; an awakening of interest in the feasibility of earlier opening of Great Lakes navigation in the spring through the use of ice breakers, resulting in the speeding up of delivery of wartime cargoes; an exhaustive and accurate outline early in 1917 on the necessity of an adequate iron ore movement on the Great Lakes to meet the tremendous building program; articles on the training of shipyard workers and labor problems; in fact, no phase of the industry was overlooked and the marine field enjoyed at his hands a most reliable and helpful source of information. Immediately after the war he clearly sketched the outlines of post-war problems. His book on *How Wooden Ships Are Built* was the outcome of a personal visit to the shipyards on the Pacific coast.



Mr. Estep was born at Stampede Tunnel, Wash., Sept. 27, 1886. He was educated in the public schools and at the University of Minnesota from which he was graduated in 1908 with the degree of mechanical engineer. He had been employed previously in the engineering department of the Northern Pacific railroad but immediately after graduating became affiliated with the editorial staff of the Penton Publishing Co., Cleveland, as assistant to R. T. Kent, engineering editor of *Iron Trade Review.* From 1916 to 1919 he served as editor of MARINE REVIEW and during 1918 and 1919 also filled the post of editorial director of the Penton Publishing Co.

Mr. Estep was a prolific writer, and numerous of his authoritative articles have appeared in *Iron Trade Review, Daily Metal Trade, The Foundry,* MARINE REVIEW, *Abrasive Industry, Power Boating* and other Penton publications, such as *The A. B. C. of Iron and Steel.* His unusual ability in this regard also was often seen in his contributions to the programs of the societies to which he belonged. In addition to his membership in the American Foundrymen's association, with which he had been active since 1914, he was secretary of the Foundry Equipment Manufacturers' association, member of the American Iron and Steel institute, American Society of Mechanical Engineers, British Iron and Steel institute, Institute of British Foundrymen, and the Association Technique de Fonderie de France. He also was a member of the Engineers' club of London, England, and of the Cleveland, Chagrin Valley Country and Big Ten University clubs, Cleveland, as well as the Cleveland chamber of commerce and other organizations. He was also a member of the honorary engineering fraternity Tau Beta Pi. His experience and great ability made him an outstanding industrial publisher. Mr. Estep's greatest single contribution to the foundry industry of the world was perhaps the promotion of a system of exchange papers between the foundry technical societies of America and Europe, which led to the triennial meeting of the world foundrymen at the International Foundrymen's congresses, the third of which was held in London in June, 1929. He was chairman of the American Foundrymen's association committee on international relations and exercised a profound influence in the work of bringing international amity through a confidence born of understanding. He also had been editor of the *Transactions* of the American Foundrymens' association.

Mr. Estep is survived by his wife, Helen Lynch Estep, and one son, Edward.



Electric Deck Auxiliaries Receiving Severe Test on the Motorship Missourian with Deck Awash in Storm

Development of Practical Seagoing Electrical Equipment Aided by Adoption of Oil Engine

By Frank V. Smith

AUXILIARY electrification on shipboard is an allied movement in progressive engineering development. Its practical worth being first proved to a large extent on diesel ships, it is today the accepted practice on all modern vessels. It was born of necessity to round out high overall economies, to simplify operation, to lower maintenance costs, and to eliminate dual powering methods.

Starting with the usual woes incident to a new development, auxiliary electrification has by sheer force of egineering courage and scientific research been brought to a peak of refinement where its adaptability and dependability can no longer be questioned.

Motors may be called upon to operate in locations where the surrounding air is heavily laden with dust, moisture or oil vapor; they may be called upon to operate at a tilt or to withstand submergence when the exposed decks are awash. Whatever the conditions of operation, there is a specific type of motor to fit the job.

Care has been exercised in the new designs to safeguard electric equipment from faulty operation. Starting control equipments are available which eliminate the "guess." Whether the operator be electrically minded or not, he can start the equipment in but one way: with the turn of a switch. What takes place after that is a properly timed sequence of automatic operations that cut out the starting resistance with mathematical precision. Magnetic mechanisms that instantaneously cut the motors off the line in case of line disturbances are also an integral part of the newer equipments.

Reversing and Speed Control

Apparatus which requires reversal and speed control is highly developed. Burned finger tips, high current surges, burned commutators are things of the past and have no place in modern engineering. The new magnetic and automatic types of control reduce all this. Cargo handling machinery that can be operated by stevedores in any port of the world are now a reality. A single lever is pushed ahead or back and the motor immediately follows suit. With the lever in the central position powerful solenoid brakes hold the load. Line disturbances lock the brakes and the load cannot fall if the current fails. Whether the lever be thrown quickly or slowly the control works in the same methodical way: at a predetermined speed to give just the proper acceleration which is smooth, positive and rapid.

Every electric application on shipboard differs in some peculiar respect. A motor attached to a reciprocating plunger pump may require a heavy breakaway torque to get started. It may start a pump against pressure or it may not. Fans and blowers, compressors, centrifugal pumps, rotary and gear pumps—all have their individual starting and load characteristics. Reduce the outlet pressure on a fan or a centrifugal pump and the power increases. Reduce the pressure on a plunger pump and the power decreases. Some applications call for wide variations in speed control; others do not.

Each application calls for a particular type of motor and a specific type

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The author, Frank V. Smith, is an engineer with the federal and marine department General Electric Co. This article was prepared at the request of the editor.

of control equipment. The motor best suited for the job may be a shunt-wound, a compound-wound or a series-wound machine, depending upon the load and starting torque characteristics. Each has its place. The control apparatus should operate quickly in some cases, slowly in others. The starting current must be sufficient to bring the motor into motion, but must not be too great or the apparatus will start with a jerk. The divisions in the starting resistors must be sufficient to provide smooth acceleration.

In addition to the electrical characteristics of the motor we must also consider the physical characteristics. What mechanical protection, what safeguards must be provided? Is the air laden with oil vapor—will the oil be deposited on the windings? If so, a totally-enclosed, fan-cooled motor that dissipates the heat through a metal diaphragm fills the bill. The outside air does not enter the motor: after five—ten years' service, the windings will still be clean. Is water likely to drip on the motor? Then the application calls for an enclosed ventilated type of motor. Is there likelihood of heavy objects falling on the motor? Then the protective covers should be made strong, not flimsy.

Many Motor Characteristics

There is as wide a difference in motors as there is in types of applications. Some motors are made to operate continuously, others intermittently. Reverse their application and they will burn up. A cargo winch calls for one kind of motor—one that can stand heavy intermittent loads; a centrifugal pump calls for another —one that can grind out power continuously, unceasingly, year in and year out. Choose the right kind of motor and it is the finest servant ever employed. Ten—twenty years elapse and it is still on the job. Some are on the job after thirty years. Give the bearings oil, keep the windings clean, dry them out if damp before loading, and that is all they require. Their efficiency is the same throughout their life.

How may the maximum benefits of electrification be realized? This is the potent question with which the shipowner is faced. He has to evaluate such items as obsolescence, maintenance costs, turn arounds per year, first cost, insurance and depreciation; he is more interested in concrete results than in engineering details.

Power in Port and at Sea

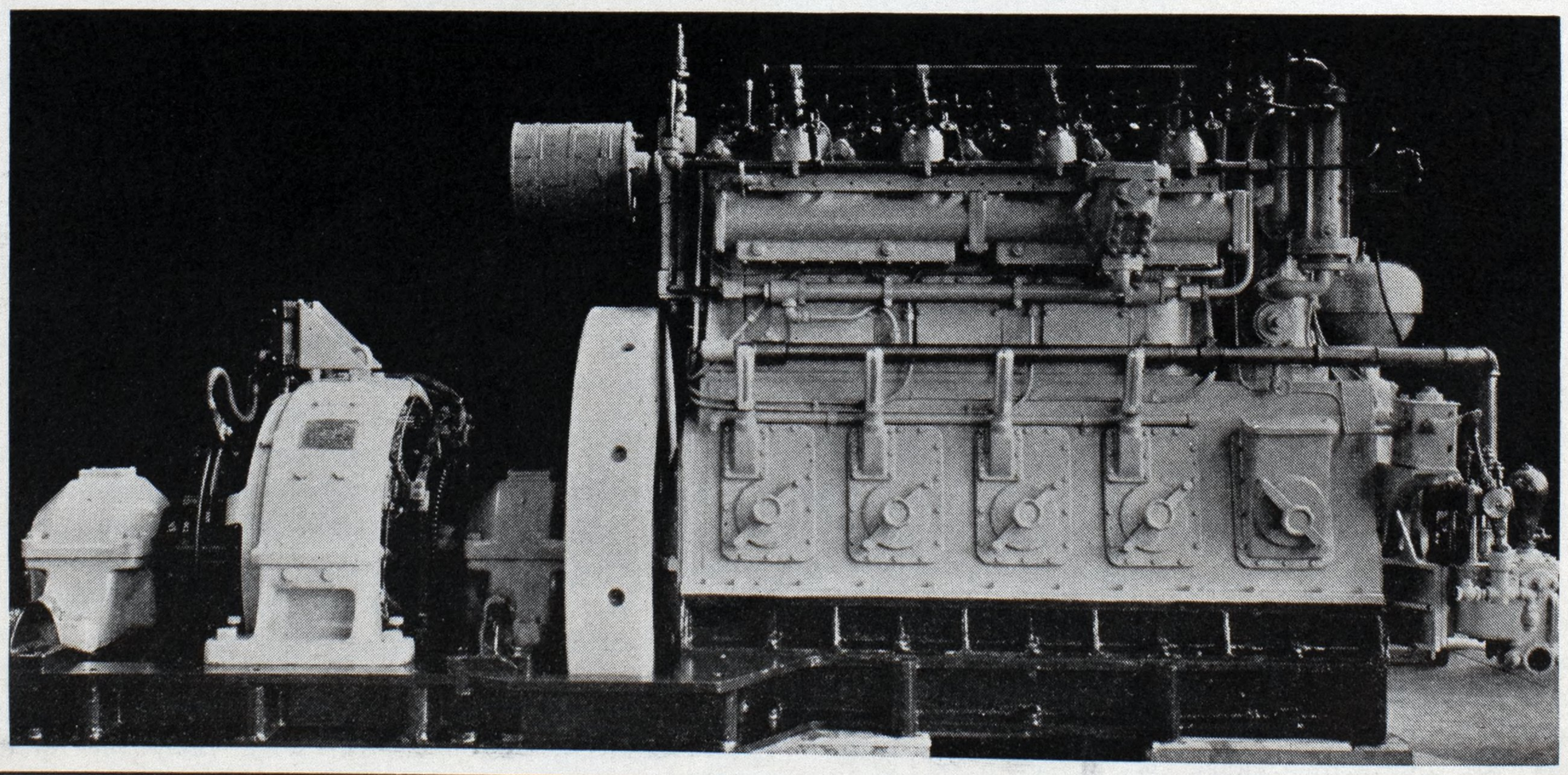
In a diesel ship, whether the main propulsion is diesel-direct or diesel electric, auxiliary electrification is a clear cut issue that stands on its own feet without complications. It stands as a separate entity because it represents a direct power need and a direct power expenditure. Auxiliary power is furnished by a diesel engine-driven generator. A distribution panel directs the power where needed. Boilers and steam lines are eliminated. But one type of fuel oil is required on the ship. The economy is of the very highest for it combines the highly efficient diesel engine with the most efficient form of driving machinery.

The problem of complete auxiliary electrification on diesel ships, whether they be directly or electrically propelled, resolves itself down to the study and evaluation of two factors; the auxiliary power needs at sea and the auxiliary power needs in port. The power plant must be designed to take care of the larger. In some cases the conditions are best satisfied when multiple powering units are provided.

Power needs at sea are influenced by the size of the main power plant and the type of ship. A freight vessel, a tanker and vessels that do not carry passengers obviously have small power needs for ship's purposes. Power for lighting, cooking, hull ventilation, sanitary pumps and the like are of small consequence and represent but a small proportion of the total. On the other hand, their port needs when loading or unloading cargo may be quite large, although of an intermittent nature. Freight vessels have extensive cargo winch equipments; tankers, extensive cargo oil pumping equipment.

Combined freight and passenger vessels and the refrigerator ships also present their individual problems. In some cases we may have a combination of the three. The more extensive the power needs become, the greater the value of electrification. The economic gains due to auxiliary electrification are always large on a percentage basis.

Whether the electrical application



A Typical Diesel Electric Generating Plant of the Newer Order for Marine Service

is in connection with the anchor windlass, capstan, gypsy, warping winch, cargo winches, or boat hoists, the same automatic control apparatus, safe and positive in action, is available and standardized for ship's use.

Auxiliary electrification considered as an economic, convenient and reliable system of powering, may be briefly accredited to the following factors:

1. Motors use energy in proportion to the demand of the driven apparatus, and the efficiency is well sustained throughout their limit of capacity.

2. The simplicity of an electric motor makes it more reliable than any other form of power.

3. The life of a good electric motor is conservatively estimated at from 10 to 15 years. The renewals required at the end of that time to put the motor in first class condition should not represent more than a 5 per cent depreciation on its capitalized investment.

4. The wear on a well constructed motor is very small because of the absence of reciprocating parts and the small number of rubbing parts.

5. There is high relative efficiency for small individual drives.

6. There is close speed regulation.

7. The control may be located anywhere desired irrespective of location of motor.

8. Motors will carry relatively high temporary overloads without injury or appreciable diminution in speed. A motor may be selected for average demands with sufficient margin of power for momentary peak loads of 150 per cent without increasing the first cost of installation.

9. Motors can be quickly started or brought up to speed without trouble or physical exertion.

10. Electrification obviates the installation of long steam lines through bulkheads and cargo holds and overcomes many objectionable features of steam drive where they are present.

The diesel ship in furthering auxiliary electrification as an effective means of eliminating the use of steam for auxiliaries has had a far-reaching result. It has broadened the field for application, promoted the greater use of the electric motor, and in turn made research, standardization, and mass production worth while in the last analysis.

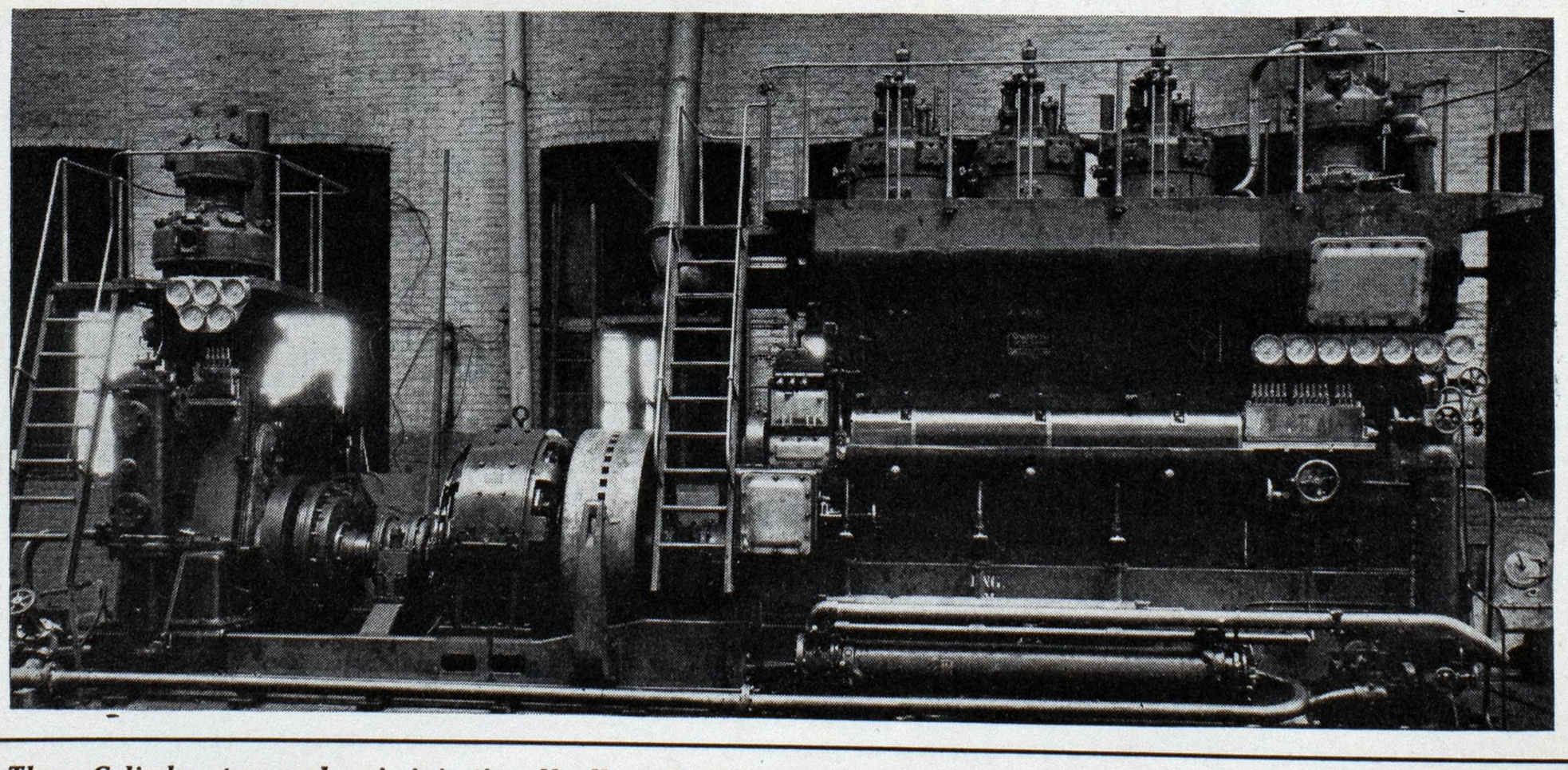
The question may be asked—What is the future likely to bring forth? The electrical engineer is always on a never-ending quest for perfection. He is a practical idealist. He wants to produce the greatest amount of work with the least consumption of power, eliminate the need for costly supervision, and lighten labor's burdens. He is looking forward, not backward, and the ships that follow in the wake of his cool, calculating and unemotional engineering decisions are in the forefront and not the background.

Build Powerful Auxiliary Diesel Sets

THE accompanying illustrations show two types of auxiliary diesel engines built during the present year for the United States shipping board by the Nordberg Mfg. Co. One of these is a straight generating unit and the other in addition to being equipped with a generator also drives an auxiliary compressor.

Twelve of these engines, six of each type were supplied as a part of the last dieselization program in which eight cargo vessels were converted from steam to diesel engine drive. Of these eight vessels, six are equipped with the engines just referred to for supplying the auxiliary service. There are two engines on each ship, one a generating unit and the other the combined unit. The installation is so arranged in the ship that one of these auxiliary units is located on either side of the main propelling engine.

These engines are all of the same size, that is they have three power cylinders and are of sufficient capacity to drive a 340-kilowatt 240-volt direct current generator to full capacity for ordinary service and to carry a 25 per cent overload for two hours. The six engines that are also equipped with the emergency and maneuvering compressor are of the same size and have the same size generator, and it is the understanding that when the air compressor is in



Three Cylinder, two cycle, air injection, Nordberg-Fiat Diesel engine direct Connected to a 340 kilowatt D.C. Generator and a 550 cubic feet per minute Free Air Compressor. One of these units installed on each of six recently converted Diesel Ships of the Shipping Board.

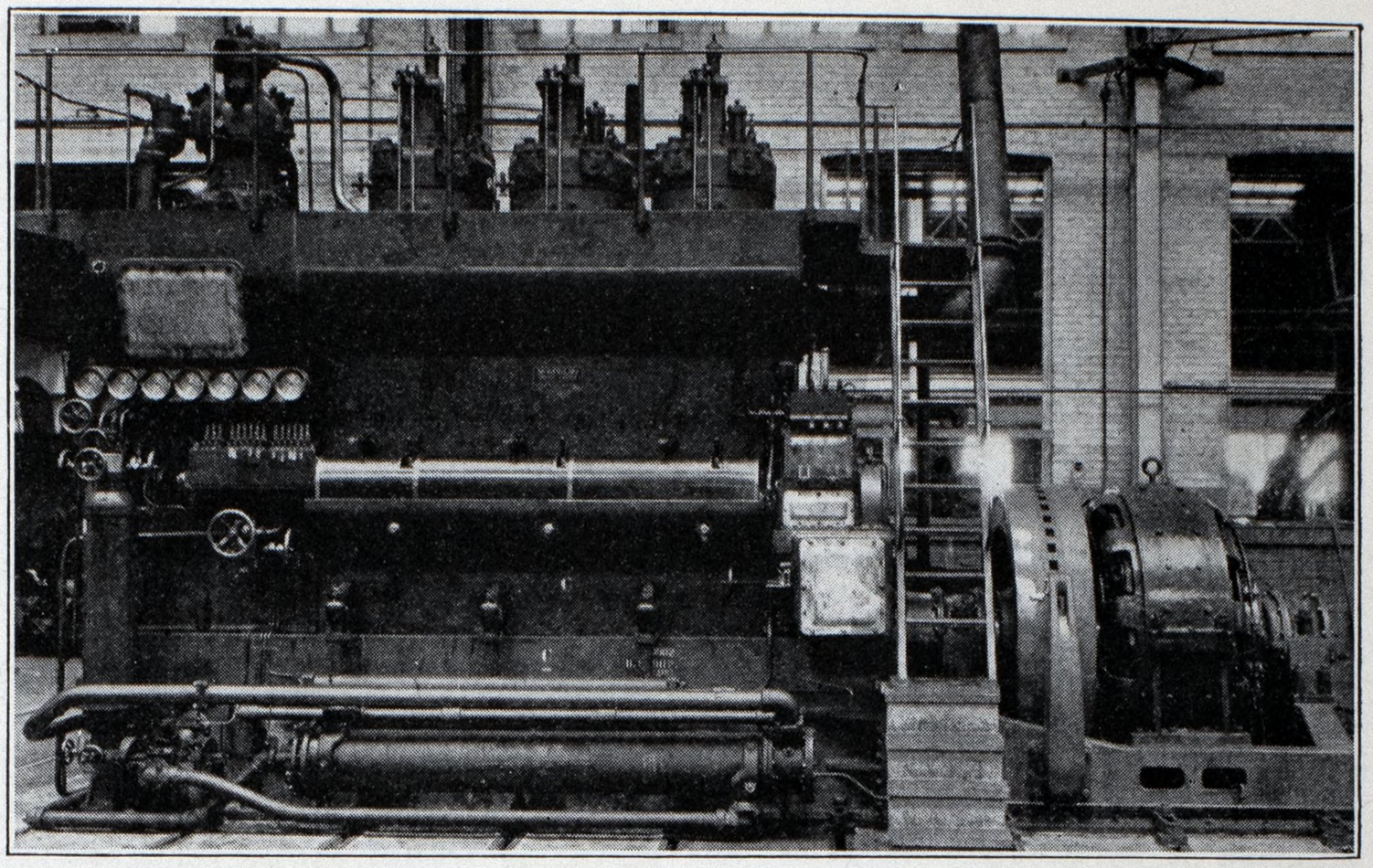
service, it is not expected that the generator will be called upon to carry full load. These units operate at 220 revolutions per minute.

The emergency and maneuvering compressors have a capacity of 550 cubic feet of free air per minute and operate at 1000 pounds pressure. They are driven through a magnetic clutch, which is so arranged that the clutch is held inoperative, until the engine has reached normal speed. The engines are of three cylinder, two cycle, air injection type, are built for heavy duty service, of crosshead design and arranged for port scavenging.

Each unit, whether with generator or the combined generator compressor unit, is complete in itself and is mounted on a substantial cast iron bedplate or sub-base. Scavenging is supplied by a reciprocating scavenging pump, mounted on the bedplate at the end opposite the flywheel. This pump is driven from a crank on the crank shaft and its construction is of the same crosshead design, that has always been used in connection with Nordberg diesels.

The air discharged from the scavenging pump, enters a manifold extending the full length of the power cylinders. The upper portion of this manifold is flat and serves as a platform when working on the parts located overhead. Superimposed on the scavenging pump, and driven from an extension of the pump rod, is the three stage air compressor for supplying air for starting and fuel injection.

The coolers for between stages and the after cooler are of the vertical type and are mounted on the rear of



Three Cylinder, two cycle, air injection, Nordberg-Fiat Diesel Engine Direct Connected to a 340-Kilowatt D.C. Generator. One of these units also installed on each of six recently converted Diesel Ships of the Shipping Board.

the engine where they are accessible for cleaning and inspection. With the exception of the power cylinders and air compressor, which are lubricated by means of mechanical force feed lubricators, all lubricating is supplied from a pressure system of lubrication.

On the units that have the emergency compressor, this same pressure system supplies the bearings for this machine also. The oil after passing through the hollow crank shaft, travels upward through the connecting rod and a portion of it is arranged to circulate through the heads of the power pistons, thereby cooling these parts by means of oil from the pressure system of lubrication. The oil then spills back into the bedplate where it is collected and pumped through the oil cooler, thereby maintaining a constant oil temperature which is a desirable feature.

The cylinder heads and jackets of the engines and emergency compressors are cooled by means of sea water. The pumps and piping for this are furnished complete, as a part of each unit.

The engines are of the enclosed design, but ready access can be had to the inside of the frame through the large aluminum covers over the openings at the rear. Each cover also has hinged inspection doors. The engines are operated from the floor, the fuel pump, governor, camshaft and other parts being readily accessible from the floor line.

Sea Trials Diesel Vessel Jeff Davis

THE last of eight boats of one class and the last of 20 United States shipping board boats to be converted from steam propulsion to direct diesel drive, the JEFF DAVIS completed successful trials in Chesapeake bay, Oct. 17. Her best speed was 15.74 knots, which compared with 15.72 for her sister ship, the POTTER.

Conversion of the 20 United States shipping board boats was run off on schedule. The first, the TAMPA, a 9100 deadweight ton ship, ran off its trials Nov. 2, 1926. The GALVESTON, a 9700-ton ship, first of the eight ships of its class to be converted, had a successful trial trip on April 19, 1929. In June three of these eight ships were given successful trials, and of the seven now in service the speed has averaged slightly above 13 knots loaded, better than expected.

Three shipyards handled the conversion of the first 12 vessels, namely, the Bethlehem Shipbuilding Corp., Fore River plant, Quincy, Mass., the Newport News Shipbuilding & Dry Dock Co., Newport News, Va., and the Todd Shipyards Corp. Tietjen & Lang, plant Hoboken, N. J. Three yards also participated in the conversion of the remaining eight vessels, namely, the Federal Shipbuilding & Dry Dock Co., Kearny, N. J., the Newport News Shipbuilding & Dry Dock Co. and the Maryland Dry Dock Co., Baltimore. Conversion of the JEFF DAVIS and of her sister ship the POTTER was done at the latter yard.

Of the engines installed on the 20 ships, Worthington Pump & Machinery Corp., Harrison, N. J., supplied four, two on ships of the smaller class and two on ships of the larger type; McIntosh & Seymour, Auburn, N. Y., supplied engines for four ships of the first twelve and two for the last eight; Busch Sulzer Bros., St. Louis, four for the first group and two for the second; Hooven, Owens, Rentschler Co., Hamilton, O., one for the first group and two for the second; and the New London Ship & Engine Co., New London, Conn., one in the first group.

In addition to the above mentioned 20, the United States shipping board let a contract to Gibbs Bros. for the supervision of work on the conversion of three ships each of 10,680 deadweight tons to diesel electric drive. These three ships were the COURAGEOUS, the DEFIANCE and the

(*Continued on Page* 98)

Fleet Corporation Cuts Operating Expense

Figures covering the last fiscal year show that the Merchant Fleet Corp. has reduced its operating expenses by more than 35 per cent, or $2,097,-398. This saving is due to a reduction in ships operated by the government and to a resultant cut in personnel of ships, while improved earnings on the part of many shipping board lines also have contributed.

An outstanding feature is the reduction in payroll. On July 1, 1928, with a total payroll of $3,601,009, those in charge of administration of the corporation set out to reduce it by 20 per cent. They succeeded in reducing it by $766,566 or 21.28 per cent. In addition the payroll of the United States lines, amounting to $1,-010,813, and that of the United States Protection and Indemnity Agency, amounting to $102,308, have been practically eliminated by the transfer of these concerns to private ownership. There also has been a reduction of $271,711 in salaries of Reserve Fleet employes.

The total budget for the next fiscal year, beginning July 1, 1930, is expected not to exceed $7,000,000, contrasted with $17,000,000 in 1927-28, $13,000,000 in 1928-29, and $11,000,000 in 1929-30 (including the appropriation for carrying coal abroad). It is estimated that the total budget figure for the present fiscal year will probably show a deficit of more than $500,000, due chiefly to deferred repair expenses on vessels, but there will be sufficient cash available to meet outstanding liabilities and commitments.

The Nippon Yusen Kaisha liner ASAMA MARU, on her maiden voyage from Nagasaki to San Francisco, where she was due on Oct. 25, carried a record cargo of 5575 bales of silk valued at $6,000,000. The ASAMA MARU is a quadruple-screw oil burner of 22,000 tons and carries 650 passengers and is considered the fastest in the Oriental service.

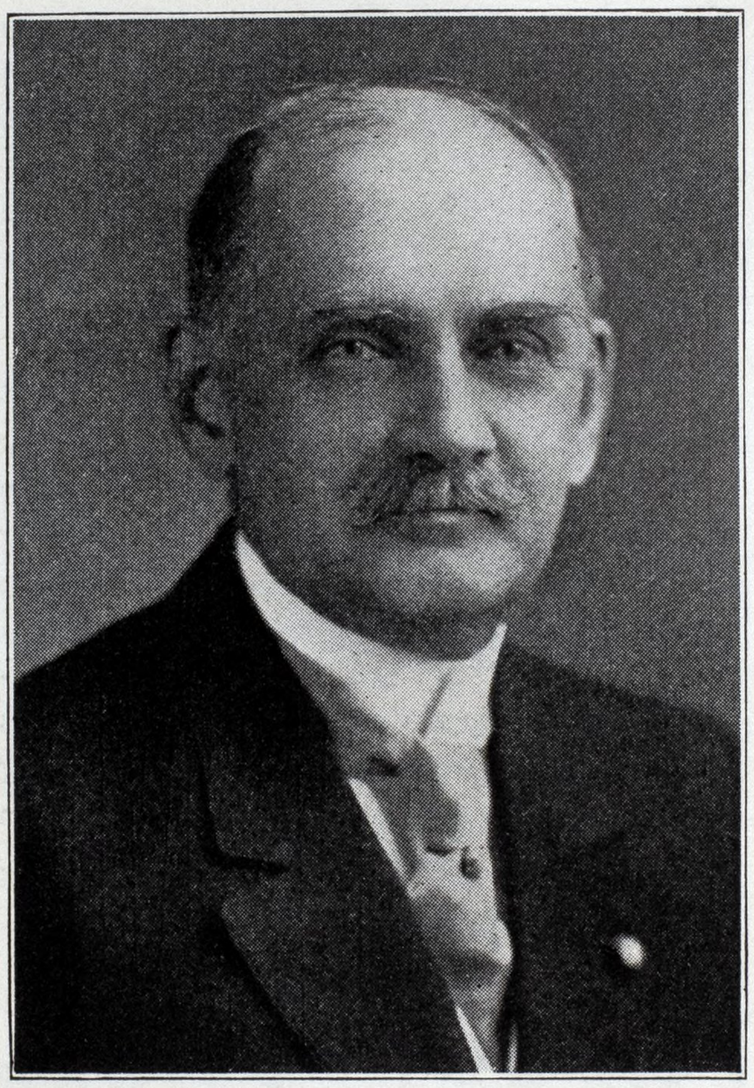
New U.S. Lines Elections

The United States lines recently announced the transfer of William Perrott, for three years operating manager at the Hoboken piers, to the newly created post of manager of construction, in charge of new construction already definitely planned. Mr. Perrott will be stationed at the main office of the lines, 45 Broadway, and will be succeeded as operating manager by Capt. D. A. Maloney, who has held the same position for the past five years with the American Merchant lines.

Edgar Molitor was appointed vice president in charge of European affairs of the United States Lines Operations Inc., effective Oct. 1. Mr. Molitor has had wide experience abroad as a representative of American financial and industrial concerns and in the import and export trade. He assumed his duties in the offices of the United States lines at 10 Rue Auber, Paris.

Former U.S. Commissioner of Navigation Dies

Mr. Eugene Tyler Chamberlain, who served as United States commissioner of navigation from 1893 to 1921, died on Oct. 8 in Bon Secour hospital,



Baltimore, after several weeks' illness.

Mr. Chamberlain was born in Albany, N. Y. in 1856. He was graduated from Harvard in 1878 and was for some years editor of The Albany *Journal* and *The Albany Argus*, later taking the position of commissioner of navigation in Washington.

He was a delegate to the International Congress for Safety at Sea in London in 1913 and had received a number of decorations from foreign governments. He was the author of a number of papers in the second campaign of President Cleveland, of whom he had written a biography.

H. B. Walker, president of the American Shipowners Association, was recently elected a member of the classification committee of the American Bureau of Shipping.

Ship Sales Authorized by Shipping Board

The shipping board on Oct. 16 authorized the sale of a number of vessels, as follows:

The steamer CARPLAKA was sold to the American Scantic line of New York, which operates between North Atlantic ports of the United States and Scandinavian and Baltic sea ports, for $153,000. The ship will be used to augment the Scantic line's service in connection with a contract recently entered into with the Polish government for maintenance of service between the new Polish port of Gydnia and the United States.

The CARPLAKA, a Hog-Island type vessel of 7825 deadweight tons, is a steel cargo ship equipped with General Electric turbines and Babcock & Wilcox oil burning boilers. She is designed to steam at 10.75 knots.

The steamer CONNERSVILLE was sold to Jac. Salvesen of Farsund, Norway, for $26,000 cash, with the understanding that the purchaser contracts in writing not to operate the vessel to or from any United States ports, excepting for one outbound cargo of coal, grain or scrap iron, and furnishes a bond of $5000 securing performance of the contract. The ship is a Lake-built vessel of 3364 deadweight tons and has been in layup at Norfolk since December, 1920. The privilege of transfer to Norwegian registry is granted with the sale.

The sale of 22 laid-up vessels to the Union Shipbuilding Co. of Baltimore was authorized with the understanding that the vessels be completely dismantled and scrapped. The sum of $335,000, cash, will be paid for the vessels, this amount being the highest bid received as a result of competitive proposals opened October 8.

Joins Salvage Board

Captain R. D. Gatewood, U. S. N. retired, who resigned as manager of the shipping board's department of maintenance and repair, effective Oct. 15, has accepted a position as general manager of the United States Salvage association, 56 Beaver street, New York. The salvage association is one of three syndicates controlled by a group of about 70 insurance companies. Captain Gatewood will head the syndicate to investigate the causes and extent of damage to ships in insurance cases and will have charge of offices in all parts of the United States and in 150 of the principal ports of the world.

Care in Repairing Diesel Engines

Special Technique Is Required—Use Only Experienced Mechanics—Complete Tool Equipment Essential—Correct Processes and Application Are Necessary

By Louis R. Ford

A FACTOR that is of considerable importance in the operation of motorships, but which does not always receive the analytical consideration it deserves, is the special technique required for correct repair of diesel engine parts.

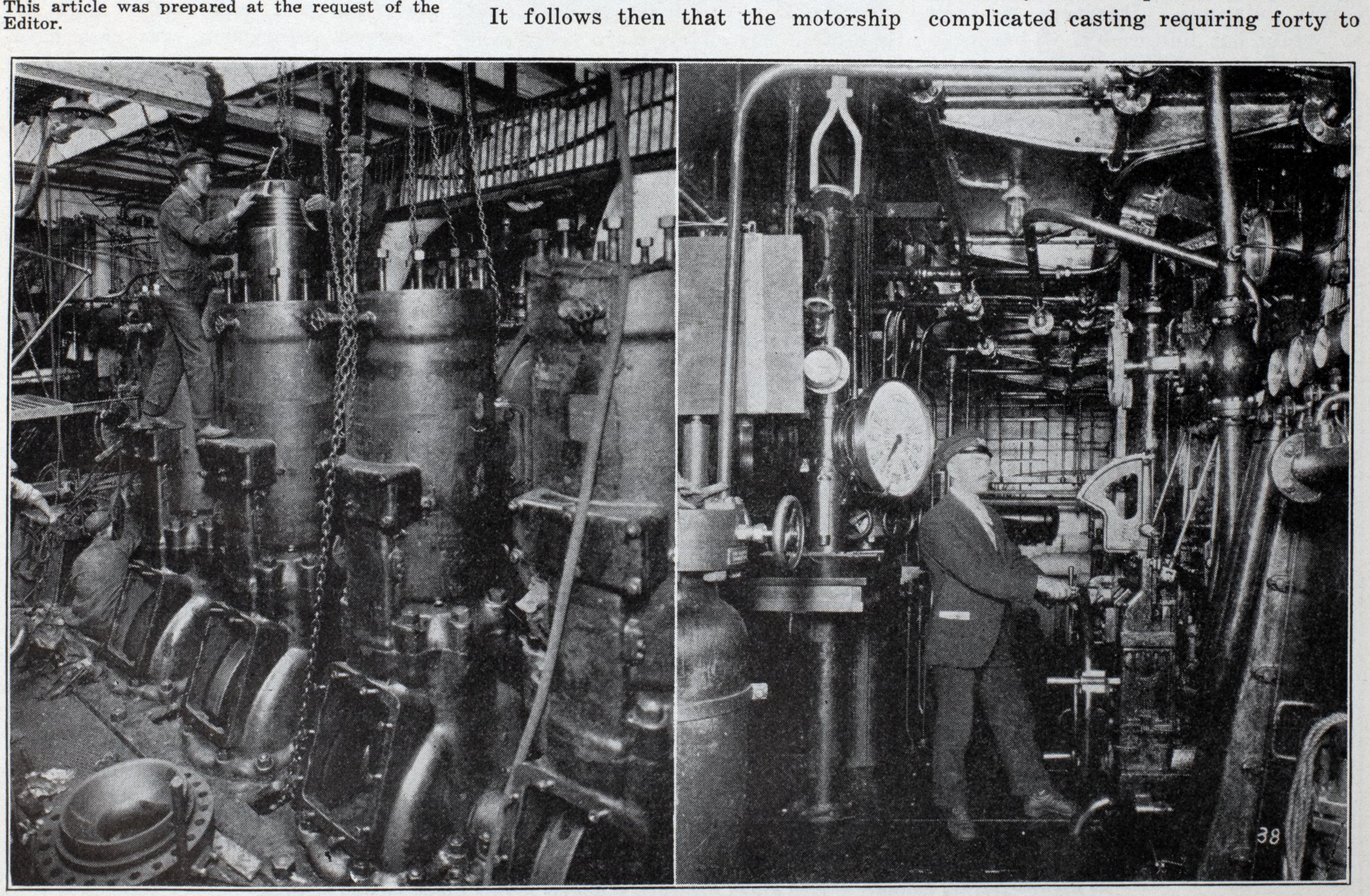
Usually the basis on which repair contracts are awarded or parts purchased is first cost, with complete disregard of other elements that often exert a marked influence on final cost. The majority of repairs to ships or their machinery are contracted for after competitive bidding, the work being given to the bidder submitting the lowest price. In many cases the bidding is unrestricted so that the largest shipyards in the country may be found bidding against small establishments whose total plant equipment represents but a fraction of the value of the tool equipment of their competitors. The policy of the average repair plant that has been struggling for existence during many lean years is to take any job that is offered, regardless of whether it is of a type that the plant is accustomed to handling.

In the case of diesel engine overhaul, this sort of thing places the repair organization that is accustomed to handling diesel repairs at a disadvantage and ultimately reacts to the disadvantage of the shipowner. The experienced diesel repair man, having knowledge of the class of work required if such repairs are to be satisfactory, and of the special procedure required in some cases, will submit a price based on such knowledge. On the other hand a competitor inexperienced in such work, or inadequately equipped for it, will submit a lower price based on experience in repairing steam machinery and may be awarded the contract by an owner who is considering price only. As a result, the successful bidder must stand a loss if the work is properly done.

It follows then that the motorship owner will be best serving his own interest by sending his machinery repairs to a shipyard that has recognized diesel engine repair work as a specialty, and has acquired the necessary equipment and personnel to treat it as such.

Without going into a detailed discussion of all the parts of the diesel engine that require attention, a few points may be brought out that will indicate the correctness of this conclusion. An important consideration is foundry practice. The cylinders, cylinder heads, liners and pistons of the diesel engine present foundry problems that are quite complex and cannot be solved by rule; the solution must be the result of experience. The cylinders, heads and pistons are more or less complicated castings that are subjected to heat stresses and pressure stresses. The liners are not only subject to these stresses but must also be hardened to resist wear, and soft enough to machine well. A liner may be a simple cast barrel or a complicated casting requiring forty to

The author, Louis R. Ford, is manager, Diesel Division, United Dry Docks Inc., New York. This article was prepared at the request of the Editor.



At Left—Assembling Diesel Engine in a Motorship at Morse Plant of the United Drydocks Inc. At Right—Chief Engineer at the Controls of the Motorship Tiradentes

Installing New Crankshaft in M. S. Svealand at Morse Plant

fifty cores and having some thick and some thin sections with sometimes abrupt changes of section, depending on the make of engine.

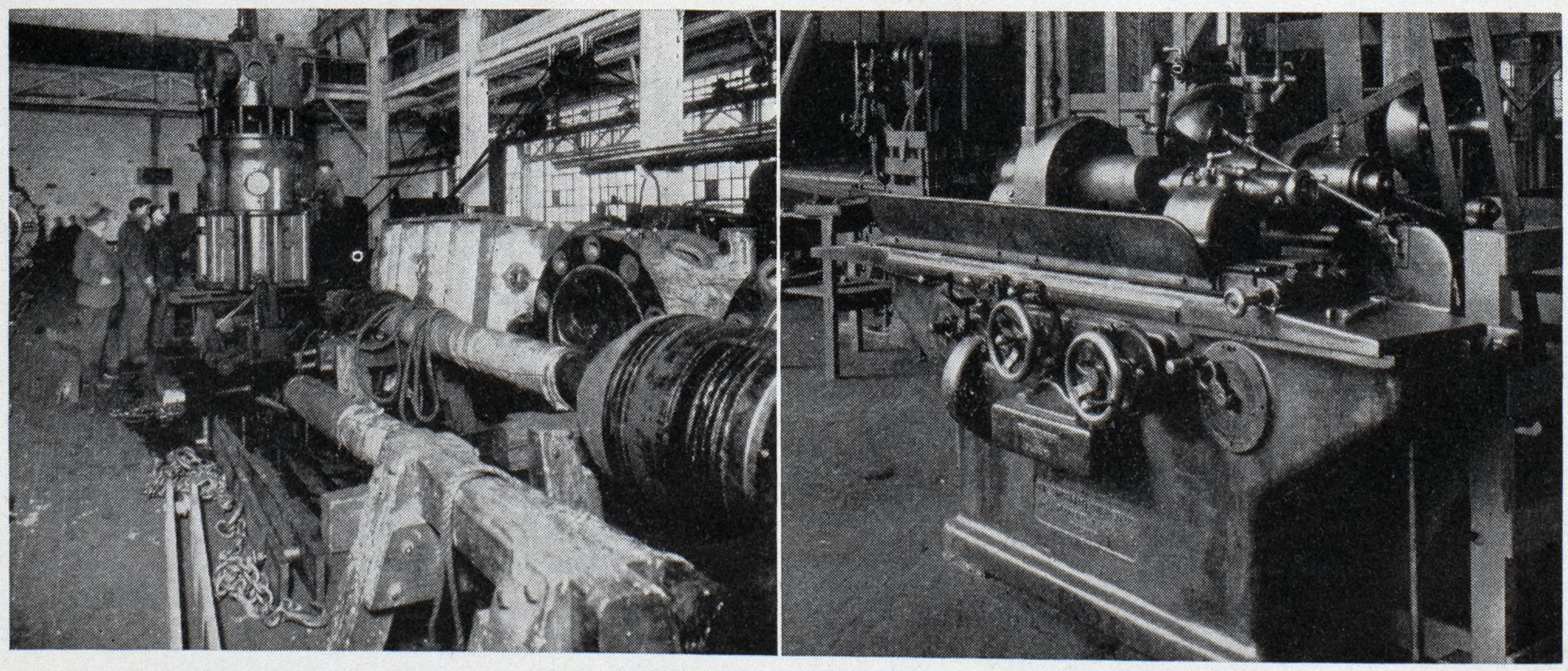
From the standpoint of machineability, the material referred to as "good, gray iron" is highly desirable but it is lacking in the necessary strength and resistance to wear. Porosity, or shrinkage holes, is a fatal defect and must be prevented by proper molding procedure and correct cupola mixtures. Hardness is easy to obtain but uniformity of hardness is not so easy. A liner having variable sections as previously mentioned, if cast especially for hardness, is apt to have the thick sections of the correct hardness and the thin sections so hard that they cannot be machined. Recent development of mixtures containing nickel and chromium has aided in producing iron having the desired qualities but obtaining this result is not merely a matter of formula and rule; the foundryman's experience is a very important factor also. This experience should cover not only the making of cupola mixtures but also special molding procedure required for each individual case.

Failure to make a good casting for a large liner or cylinder the first time often has effects more far reaching than the necessity for the foundry to make a new casting. Most defective castings are good on the outer surfaces and the defects are revealed during machining. Machining may extend over a period of days before the defects are encountered, and then all the time and labor of the machine shop is lost. Time is usually the essence of every ship repair contract and the loss of a casting may result in penalizing the shipyard with demurrage charges. The natural result is that the irresponsible yard will try to obtain acceptance of castings not up to the standard of quality required for use in diesel engines resulting in serious failure.

Shop Processes Important

The shop processes used in the shaping and fitting of diesel engine parts in some cases require special equipment that the ordinary repair yard does not possess and which the repair man inexperienced with this class of work does not consider necessary. An example of this is the heat treating equipment required for piston pins. pump plungers, fulcrum pins, etc. A case came to the writer's attention where a new piston pin for an auxiliary engine was required in a hurry; the new pin, of low carbon steel, was machined slightly oversize for hardening then sent to the blacksmith shop for cyanide hardening in the forge. The subsequent finish grinding of course removed the very thin case produced by this method of hardening and the new pin was ruined after one day's use in the engine. A replacement pin, made under more experienced supervision, was case hardened to a depth of 1/32-inch in a heat treating furnace and is still giving satisfactory service.

It is considered by some persons, and is true to a certain degree, that any machinist skilled in ordinary ma-



At Right—Testing Cylinder of 2700 Brake Horsepower Double Acting Diesel Engine in Shop.
At Left—Wrist Pin Grinding Machine at Morse Plant, United Drydocks, Inc.

rine engine repair work is competent to execute diesel engine repairs under experienced supervision, and it is the practice in some plants to select "run of the mine" machinists from those who shape up in the morning, for assignment to diesel work or any other work that may have come in. This method works all right in many cases but it is also the cause of many unsatisfactory jobs that have to be done over at once or later reveal themselves as the causes of poor engine performance. A better method, but one that is not practicable unless the shipyard specializes in diesel work and has a fairly constant volume of it, is to select for this work only experienced diesel engine men. In the fitting up and assembly of various engine parts such as air compressors, fuel pumps, fuel valves, etc., even the most skillful mechanic will do his work more intelligently and with less chance of error if he understands something of the function of each of the parts he is handling. The principle is the same as that on which is based the old story of the painstaking but green engineer who carefully replaced all of the grease balls he found on top of the air pump bucket when he opened the pump up for examination. It has been found that the best machinists for diesel engine work are those who have had experience at sea in the engine rooms of motor ships, although it does not follow that every seagoing engineer is a good machinist.

At times it happens that a process will receive blanket condemnation as unfit for diesel engine repair work when the fault lies with the manner of application and not with the process itself. A case in point is the salvaging of cracked pistons by welding. One shipyard employs this method with marked success, this success being due principally to careful attention to details of procedure, and has put back into service a number of cracked pistons for a company operating a very large number of motorships. Recently a chief engineer on one of these ships insisted on having his cracked pistons welded in a foreign port where a lower price could be obtained but not one of them could be used afterward.

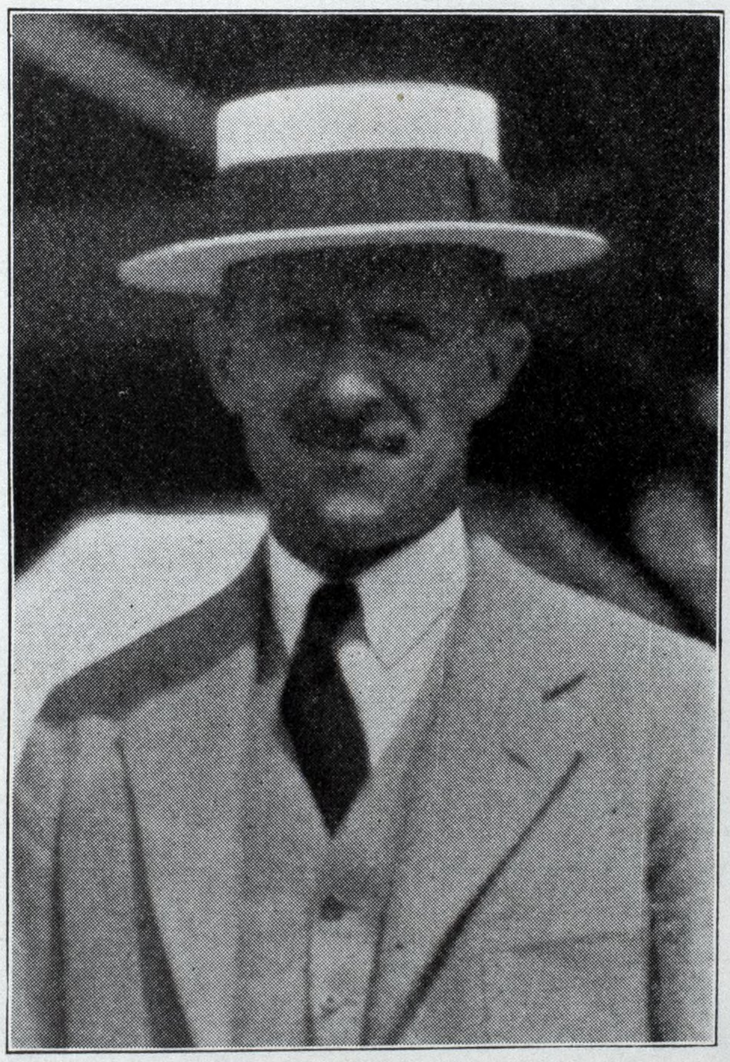
It might be argued that the foregoing discussion tends to place the diesel engine in a class of machinery the repair of which is so highly specialized as to be too expensive. In answer to that might be cited the automobile, universally accepted as an integral part of our daily existence and probably the most fool proof mechanism ever devised. Very few persons would take an automobile to a general machine shop for repairs if a service station was available.

Hold Convention of Port Authorities

THE eighteenth annual convention of the American Association of Port Authorities was held in Quebec, Canada, from Sept. 23 to 26, but in addition to the business sessions in Quebec, the official program included formal visits and port inspections at Chicago, Toronto, Montreal, and New York. The Chicago committee on harbors, wharves and bridges, department of public works, entertained the delegates on Sept. 20, and on the next day the Toronto harbor commissioners were hosts. Following the convention dates in Quebec, the Montreal harbor commissioners received the visitors on Sept. 27 for a day of harbor study, and on Sept. 28 the Port of New York Authority acted as hosts for an inspection trip through New York harbor.

Brigadier General T. L. Tremblay, C.M.G., D.S.O., general manager and chief engineer of the Quebec Harbor Commission and president of the association, presided at the Quebec convention. In addition to the reports of 15 standing committees, there were presented 11 papers relating to problems and conditions in port administration. The report of the research committee presented by George F. Nicholson of Los Angeles, chairman, dealt with the size of wharves and sheds, and value of shipside cranes in cargo handling. The committee recommended minimum length of 500 feet for wharf berths, with preference for greater length, and suggested an average width of 120 feet for one-story transit sheds, to be varied for class and conditions of traffic.

The port standardization committee, Charles H. Gant, Wilmington, Del., chairman, presented the report



BRIG. GEN. T. L. TREMBLAY

of the technical committee on the standardization of port facilities created by the American Marine Standards committee, which is obtaining suggestions as to procedure and designs of port equipment or facilities that can be standardized.

In his paper on "Uniform Port Practices and Terminal Rates" George F. Nicholson, harbor engineer for the Los Angeles harbor board, proposed that committees be formed on the Atlantic and Gulf coasts to undertake the establishment of uniform port practices and terminal rates, corresponding to a similar effort in which the ports of the Pacific coast already have joined. While conceding that no uniform charges can result in making all ports alike, Mr. Nicholson stated that careful research showed that the different problems of various port terminals are fundamentally alike and, in the broader interests of uniformity, may be subjected to the same general rules, rates and charges for all practical purposes.

J. Gordon Bohannan, chairman of the state port authority of Virginia, read a paper on "Need for Co-ordinating Port Terminal Facilities" in which he dealt at length with the variety of conflicting interests in those ports which do not have unified waterfront control. He advocated an authority similar to a municipal zoning commission but created by the state, "empowered to control the location, construction, extension, and alteration of water terminal facilities within the port areas by the issue of permits or the refusal to issue permits."

Major General William L. Sibert, Alabama State Docks commission, Mobile, was elected president for the year 1929-30. Tiley S. McChesney, 200 New Orleans Court building, New Orleans, is secretary of the association. The 1930 convention will be held in Milwaukee.

Lubrication for Diesel Engines

Effect of Cylinder Size—Even Distribution of Oil Essential—Oil Film Must Withstand High Temperatures—Eliminate Impurities in Fuel

Part I

SUCCESS in the operation of diesel engines depends largely upon the completeness with which lubricating oil films are formed and maintained between moving parts, and upon the nature of the films supplied.

Marine diesel engines are provided with systems for lubrication which are often a combination of two or more oiling methods. These methods may be grouped as follows:

	Cylinders	Bearings
(a)	Mechanical Force Feed (No Oil Throw)	Circulation Oiling
(b)	Mechanical Force Feed	Mech. Force Feed
(c)	Mechanical Force Feed (With Oil Throw)	Circulation Oiling
(d)	Oil Throw Only	Circulation Oiling
(e)	Circulation System	Circulation Oiling

The lubricated parts may be grouped as follows:

(a) Power Cylinders
(b) Air-Compressor Cylinders (of air-injection Diesels)
(c) Bearings

The film of lubricating oil on diesel cylinder walls is microscopic in its thickness, and is exposed to the heat of burned or burning gases. The intensity of this heat varies from a maximum adjacent to combustion chambers, to a minimum at the remotest point. Moreover, by the very nature of the piston movement, that part of the film which is exposed to highest temperature is thinnest, and remains uncovered for the greatest length of time. The entire film must be maintained, in spite of exposure to this range of temperature while running.

Effect of Cylinder Size

The effect of heat, and consequent temperature, upon the lubricating oil film may be expressed in terms of cylinder size. Assuming equal mean effective pressures, the larger the diameter of the cylinders the less do gases lose heat during the power strokes. This tends to increase the temperature difference between the gases and cooling water. Moreover the inevitable increase in wall thickness of large cylinders tends to decrease the proportional amount of heat absorbed by the cooling water, and to increase, consequently, the temperature of the oil film. In other words, the greater the size of the cylinder, the more severe is the influence of temperature on the film.

High pressure and high temperature occur simultaneously in diesel cylinders, and their combined action upon the lubricating oil film under adverse conditions can result quickly in loss of compression, excessive wear, and consequent increased power and upkeep costs. It is evident, therefore, that the oil selected must quickly form and replenish its own lubricating film; it must have those special properties whereby a mere coating upon cylinder walls will have film strength, even when exposed to high combustion temperatures, and will resist the pressure that necessarily acts upon it through the piston rings; it must at all times

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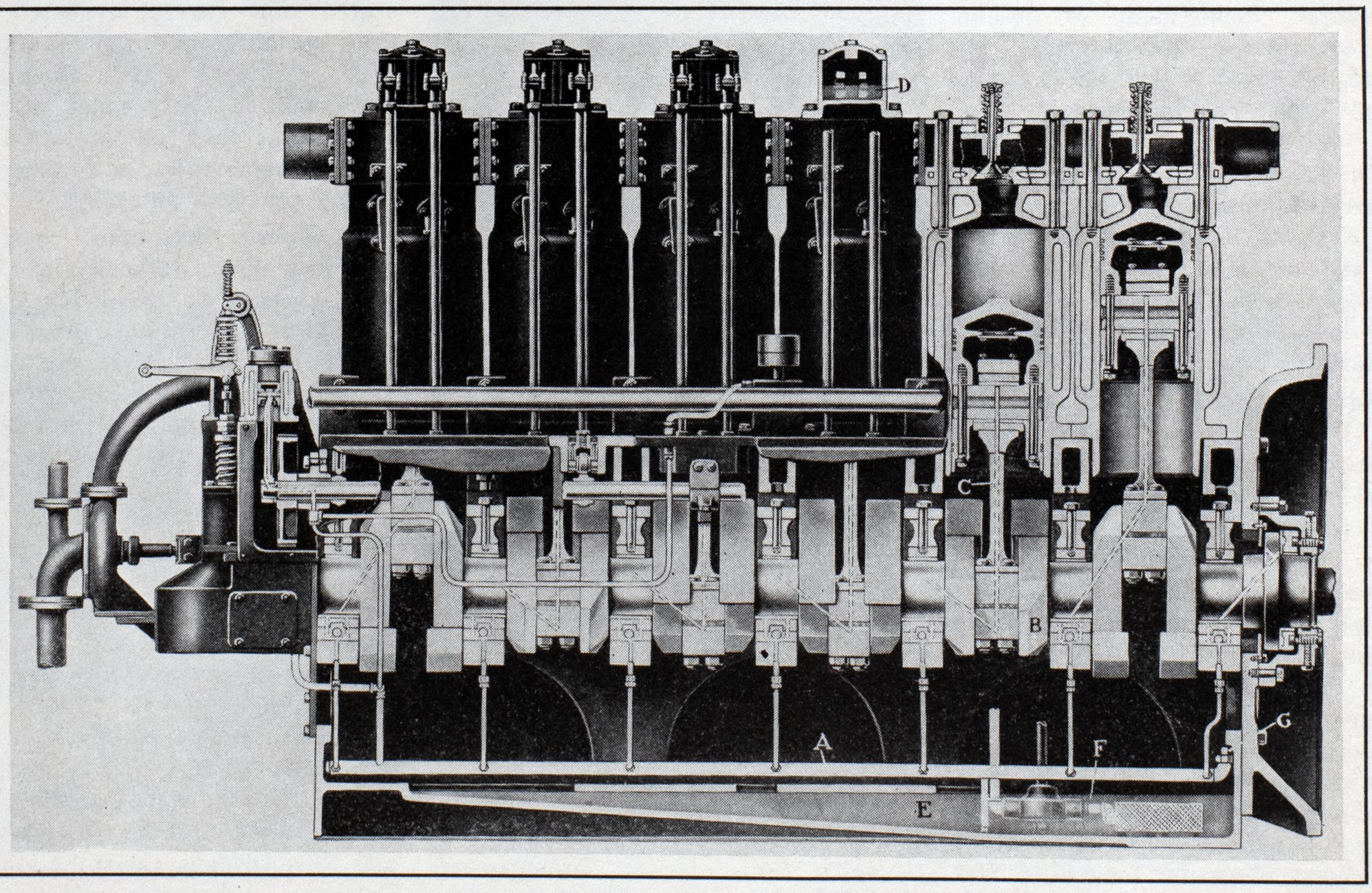
The concluding installment of this interesting and authoritative article on lubrication of diesel engines, which was prepared exclusively for MARINE REVIEW by the Technical Department of the Vacuum Oil Co., will appear in the December issue.



High Speed Four-Cycle Diesel forced feed Circulation for Bearings. Cylinders Lubricated by Oil thrown from Moving Parts A—Distributing Header. B—Crankshaft drilled for oil. C—Connecting Rod drilled for oil to Piston Pin. D—Oil bath for Valve Rocker Arm. E—Oil Sump. F—Oil Pump to Filter. G—From Filter.

maintain an effective piston seal. It must accomplish these things under most severe operating conditions, i.e., at the combustion ends of the cylinders, where temperature and pressure are greatest, and where wear is always first detected. It is only by maintaining an effective film at all points upon cylinder walls that diesel engines can operate continuously and economically to the best advantage.

Selection of Lubricating Oil

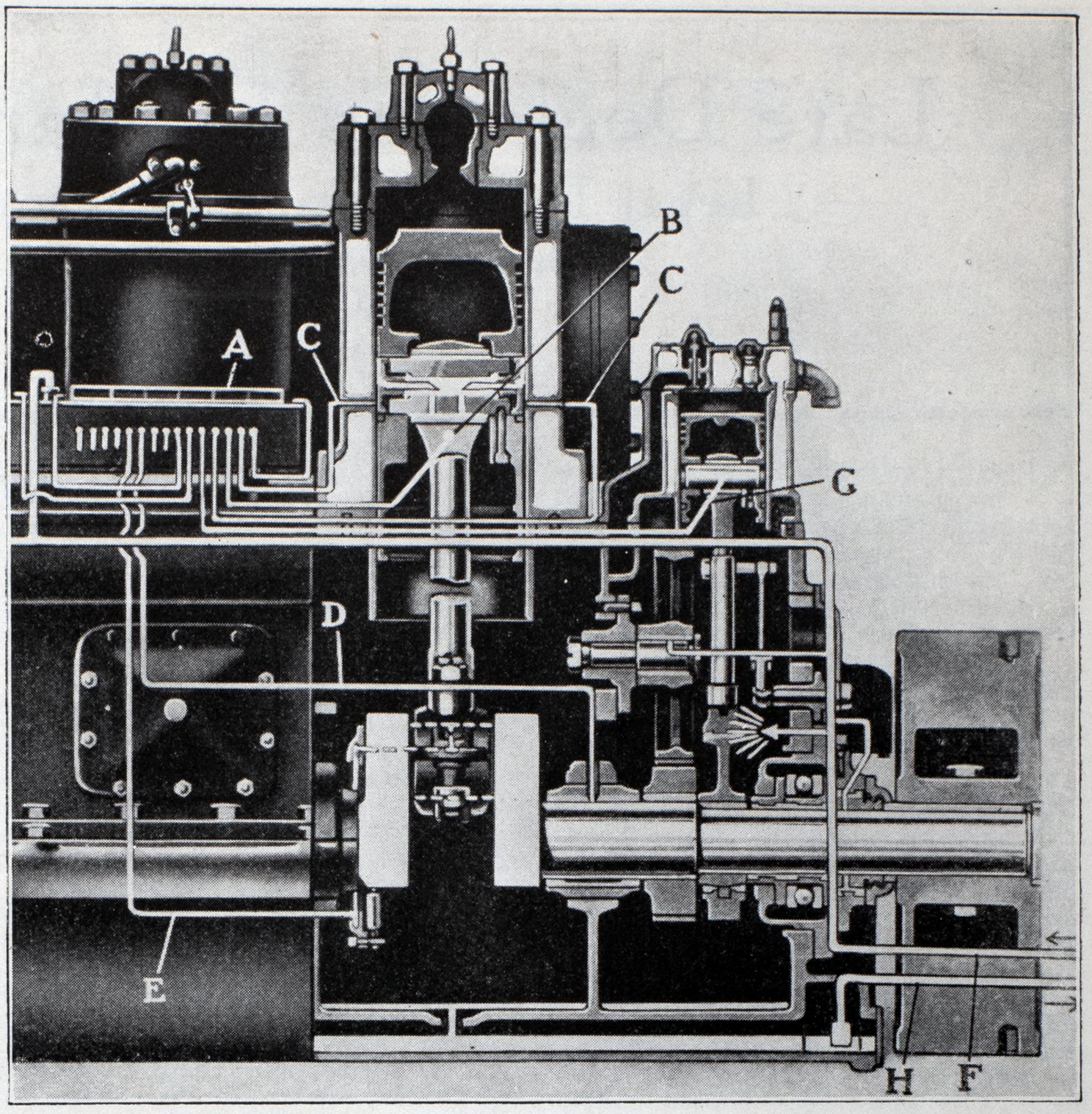
In general, too-heavy an oil will not distribute readily; it must be fed liberally in order to prevent dry spots on cylinder walls. Light oil is quickly distributed, but too-light an oil will not resist ring pressure nor will it provide adequate piston seal; wear and blowby will result unless the oil is fed in large quantities. Over-lubrication of this sort can but result in excessive carbon formation and consequent troubles.

When cylinders are supplied by a mechanical force-feed lubricator, distribution is assisted by introducing the oil at several points. If these points are far apart, the adjacent wall surfaces must receive excessive quantities of oil in order that sufficient lubrication may reach more distant surfaces. In certain types of engines, therefore, the fluidity of the oil must be adapted to the distance between these points of introduction, in order to assure complete distribution without excessive feed and undue carbon.

The cause of deposits can also be traced to the use of inferior oil. If these deposits are to be minimized it is of the greatest importance that proper oil be used, taking into account its character, the crudes from which it was made, and the method of its refining. It is equally vital that the feed be reduced to the bare minimum required to form and maintain the essential oil film.

When cylinders are lubricated by oil thrown from the bearing system, operators have no control over the rate of feed. This condition is found usually in small high-speed engines, in which dependable oil supply to cylinder walls is assured by this liberal method of furnishing it. Baffle plates or special scraper rings help to keep excessive quantities of oil from reaching the walls and over-lubricating them; but it is also of vital importance that the oil selected should have sufficient body to reduce the throw to the walls to a proper amount. In addition, the oil should be of a character that will assure effective lubrication with minimum carbon.

Fluid friction, of course, plays an important part in the lubrication of diesel cylinders having long trunk pistons; but even here, the necessity for preventing to the greatest extent excessive wear and for maintaining perfect piston seal is still paramount. Furthermore, the question of oil distribution, which tends toward the selection of the lightest oil suited to operating temperatures and pressures, results also in a reduction of fluid friction as much as is possible.



Lubricating Oil Supply by mechanical force feed to Cylinders and all principal Bearings. A—Mechanical force feed Lubricator. B—Oil lead to Cylinder. C—Oil lead to Cylinder and also lubrication for Piston Pin. D—Oil lead to Main Bearing. E—Oil lead to Crank Pin. F—Filtered Oil to Lubricator. G—Oil lead for Cylinder of Compressor. H—To Filter.

Lubrication of Power Cylinders

It is impossible to expect that any one brand of oil will serve with maximum efficiency over the wide range of sizes and systems of lubrication found in diesel engines. We can, however, express the requirements of diesel cylinder lubrication in the following terms: that the lubricating oil shall have characteristics that will give its film sufficient strength at the high temperature and pressure to which it is exposed; that it shall have a fluidity that will permit ready distribution; that it shall be able to resist the formation of carbon deposits.

One of the most common diesel troubles is the accumulation of deposits in power cylinders. These deposits are found in piston-ring grooves, on spray nozzles, on exhaust valves of four-stroke-cycle engines, and in exhaust ports of two-stroke-cycle motors. They can be caused by over-lubrication or by improper lubricating oil, but in many cases they are due to fuel and its manner of injection; sometimes they are not carbon deposits at all, but accumulations of incombustible impurities from the fuel or from the intake air.

Excessive consumption by power cylinders open to the crankcase may be due to worn piston rings and grooves. Wear allows the rings to pump oil from the lower walls, forcing this surplus to the hot upper surfaces where it may be consumed. Increased oil consumption may also be due to ineffective functioning of scraper rings. In either case proper mechanical condition will avoid over-lubrication and the resulting carbon deposits.

When the rates of feed can be controlled, excessive lubrication of power cylinders can be avoided by studying the requirements of the units, and by adjusting mechanical force-feed lubricators for efficient lubrication with minimum deposits.

Insufficient atomization of fuel re-

(*Continued on Page* 100)

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

NEGLIGENCE relating to ventilating perishable cargo is a fault relating to the cargo alone, as is the failure to properly place a tarpaulin over the hatch cover or keeping cargoes sufficiently refrigerated, with respect to defense of exceptions in bill of lading relieving from liability for defects in steamer, etc.—Barr v. International Mercantile Marine Co., 29 F. (2d) 26.

* * *

ANY obstruction to navigation is unlawful, since the public is entitled to the unobstructed use of every part of a navigable river; and the owner of a bridge over a navigable stream, constructed pursuant to federal statute, has the burden of proof to show that in its erection and maintenance it conforms to the requirements of the permit, since grants of such nature against public right must be strictly construed.—United States v. Norfolk-Berkley Bridge Corp., 29 F. (2d) 115.

* * *

TO HAVE been seaworthy on leaving port, a vessel must have been reasonably fit to carry the cargo; therefore, a vessel carrying a cargo of coconut oil in a deep tank, a hole in which was not closed with a rivet, permitting contamination by fuel oil stored near by, was not seaworthy on leaving port.—Philippine Refining Corp. v. United States, 29 F. (2d) 134.

* * *

IN THE case of No. 1004, 29 F. (2d) 203, the court held that a tug coming down the East river without being able to see anything on the starboard hand, and either without a lookout or with an incompetent one, was at fault in a collision, together with a tug shoving a carfloat directly across her course without maintaining a lookout or paying any attention to the approaching tug under the assumption that she would turn out, the collision being in waters free from other vessels and in clear daylight.

* * *

IT IS the duty of a tugmaster, who adds his tow to a moored flotilla, to inspect the lines with reference to their ability to bear the added weight under conditions of tide and weather which are to be anticipated. But a tug is not an insurer of the safe mooring of the flotilla, and, if the boats, or some of them, should break adrift through some latent defect or unexpected condition, which reasonable foresight and care would not have anticipated, the tug will not be responsible. Ordinarily the first wrongdoer is not held responsible for damages, as to injuries to tow, which result both from his own negligence and that of a subsequently intervening third party, unless the latter's negligence was such as the first wrongdoer might reasonably have expected to occur.—Cleary Bros. v. Port Reading Railroad Co., 29 F. (2d) 495.

* * *

AS GENERALLY understood, a channel is a depression, either natural or artificial, below the permanent banks over which the waters flow; but, said the court in Eastern Transportation Co. v. United States, 29 F. (2d) 588, as used in connection with navigation, it is generally understood to mean the line of deep water which vessels follow in navigating from place to place. The court held, further, that the fact that the Lighthouse department undertook to search for and mark the wreck of a vessel, sunk in a navigable channel, did not relieve the owner of the statutory obligation to use due diligence to find it or formally abandon it by notice to the secretary of war. The cases hold, said the court, that, when the wreck is found, and the Lighthouse service, either voluntarily or at the request of the owner, buoys and lights the wreck, the owner may not therefore be held for damage caused by the faulty way in which the work is done. This is so because, when they act with respect to marking a wreck, they act officially, and because the owner, though he may believe a better and safer way should be adopted, is not authorized for that reason to challenge or change what they have done. But there is no obligation on the service to find a wreck. On the contrary, this duty is imposed on the owner, and though the service may extend its facilities to the owner to aid in finding the wreck in the interest of safe navigation, such action on its part does not preempt the field or excuse the owner from the personal performance of a duty imposed by law.

* * *

A "GANGPLANK" is a connecting link between the dock and the ship. It should be considered as an extension to the land in passage from the dock to the ship, and in passage from the ship to the dock as an extension to the ship. It was therefore held, in the case of BRAND, 29 F. (2d) 792, that injury to a longshoreman on a gangplank while passing from the dock to the ship was not within admiralty jurisdiction.

* * *

THE facts stated in the case of SOUTH SHORE, 29 F. (2d) 207, show that owners of the vessel contracted with the city of Newark for a place to tie up certain excursion boats for the winter, under a contract which did not provide for removal of wreckage, that one of the boats sank and blocked navigation, that the owners abandoned the vessel, and that the city had the vessel removed at a cost of $22,000. The court held that in view of the contract the owners were entitled to have liability to the city limited to the value of the vessel.

* * *

ORDINARILY, said the court in the case of TOWNSEND, 29 F. (2d) 491, after the tug has brought its tow to a safe berth it is the duty of the bargee to see that mooring is proper, though, if this requires more nautical skill than a boatman can be expected to have, the tug may be held at fault for not seeing that a better fast was made. By analogy, it would seem that ordinarily it is the bargee's duty to see that his barge does not move from the place she is beached, and to drop an anchor if that be necessary.

* * *

AS APPLIED to ocean carriers, the term "deviation" was originally and generally employed to express the wandering or straying of a vessel from the customary course of the voyage, but in the course of time it has come to mean any variation in the conduct of a ship in the carriage of goods whereby the risk incident to the shipment will be increased, such as carrying the cargo on the deck of the ship contrary to custom and without the consent of the shipper, delay in carrying the goods, failure to deliver the goods at the port named in the bill of lading and carrying them farther to another port, or bringing them back to the port of original shipment and reshipping them. Such conduct has been held to be a departure from the course of agreed transit and to constitute a "deviation" whereby the goods have been subjected to greater risks, and, when lost or damaged in consequence thereof, clauses of exception in bills of lading limiting liability cease to appy.—G. W. Sheldon & Co. v. Hamburg Americanische Packetfahrt-Actien-Gesellschaft, 28 F. (2d) 249.

* * *

ANCHORED barge, which, during a storm of which she was forewarned, had out but one of her two anchors until after it began to drag, while others near, having both anchors. did not drag, was in fault for collision with another barge against which she drifted.—SEA KING, 29 F. (2d) 5.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	577	2,642,897	567	2,548,764
August	584	2,537,306	626	2,775,730
July	580	2,648,419	588	2,582,929
June	575	2,511,671	582	2,582,929
May	605	2,612.925	640	2,782,012
**April	626	2,677,963	606	2,547,409
March	576	2,428,002	599	2,587,030
February	534	2,345,973	550	2,391,154
January	528	2,416,692	543	2,385,658
December, 1928....	554	2,369,709	559	2,342,928

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	107	282,105	61	145,895
August	110	271,857	54	120,595
July	120	321,726	70	188,269
June	97	254,811	61	140,065
May	126	343.548	75	191,192
**April	118	318,240	76	194,158
March	117	309,233	81	203,080
February	98	263,790	56	163,324
January	86	243.505	63	187.612
December, 1928	106	309,214	72	213,261

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	139	387,061	106	265,839
August	139	387,061	106	265,839
July	151	376,620	109	327,487
June	135	309,662	103	268,270
May	139	343,990	113	286,147
April	125	328,493	87	221,533
March, ...	90	305,532	59	209,077
February, ...	96	289,629	58	196,264
January	94	294,036	47	164,132
December, 1928	100	312,100	69	214,047

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	30	58,497	30	64,559
August	32	59,299	31	58,111
July	31	55,932	31	53,761
June	29	49,060	28	47,961
May	24	39,080	25	39,830
April	20	45,922	21	48,999
March	15	36,185	15	38,415
February, ...	19	46,400	17	46,121
January	20	59,830	21	61,434
December, 1928	25	61,251	25	62,930

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	9	38,226	5	23,339
August	6	24,438	6	25,315
July	12	38,408	9	29,585
June	11	40,920	7	31,040
May	11	39,061	5	18,506
April	5	20,267	5	17,898
March	5	19,121	5	21,902
February	2	5,891	4	17,323
January	7	24,095	4	17,289
December, 1928	6	20,741	8	32,974

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	33	129,576	52	191,302
August	45	166,207	65	229,834
May	26	98,630	48	172,196
April	36	136,793	47	169,257
March	45	170,528	64	232,651
February	35	137,304	48	181,425
January	27	105,843	50	181,584
December	39	144,128	56	205,572
**November	30	115,469	53	198,195
October, 1928.....	42	154,623	62	224,018

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	117	374,893	108	355,532
August	141	444,315	150	466,464
July	160	499,292	158	485,913
June	135	430,355	134	427,138
May	155	478,043	155	465,843
April	158	471,851	156	465,710
March, ...	131	401,217	138	426,539
February	127	397,147	132	410,667
January	126	386.102	122	372,302
December, 1928	127	392,832	134	400,355

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	27	67,040	74	189,010
August	32	86,983	95	256,104
July	32	74,562	97	220,215
June	23	39,983	78	160,520
May	29	80,599	89	228,221
April	20	54,399	73	215,664
March	22	55,442	84	217,780
February	20	55,902	58	155,238
January	18	36,737	61	154,970
December, 1928....	32	78,123	90	223,258

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	17	36,618	13	23,731
August	18	45,422	10	15,617
July	12	21,338	12	22,111
June	14	21,699	16	35,889
May	12	24,974	12	26,010
April	15	33,734	13	27,662
March	20	25,950	16	21,897
February	17	27,851	9	13,422
January	16	19,754	14	28,046
December, 1928	13	17,657	7	9,510

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	55	64,464	59	72,321
August	60	70,851	60	68,913
July	72	84,674	67	80,233
June	68	81,920	68	78,980
May	99	110,911	100	110,658
April	79	77,934	75	77,672
March	77	82,370	76	96,935
February	84	104,667	73	90,947
January	82	98,373	79	99,243
December, 1928	79	79,816	72	79,354

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	91	208,323	83	213,660
August	96	233,785	83	193,379
July	110	267,053	109	264,552
June	97	204,219	98	218,437
May	89	211,519	75	168,343
April	102	213,941	77	174,116
March	102	220,251	105	264.084
February	85	202,594	69	164,847
January	83	186.978	79	168,403
December, 1928	100	234,963	89	212,341

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	46	203,192	47	203,236
August	62	258,910	63	263,569
July	64	259,303	62	252,021
June	48	199,237	56	233,867
May	51	216,463	53	221,564
April	62	264,744	61	254,647
March	57	234,394	59	248,901
February	53	222,462	55	225,789
January	60	242,464	73	290,077
December, 1928	62	249,729	63	259,823

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	257	684,203	260	698,665
August	272	726,363	273	721,024
July	279	712,324	288	741,716
June	277	708,089	273	711,898
May	289	758,671	277	717,581
April	294	751,444	278	708,155
March	283	773,515	298	517,632
February	248	682,052	249	675,432
January	273	710,969	282	744,078
December	274	762,019	260	690,010
November, 1928....	252	690,157	263	716,105

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
April, 1929	24	62,976	26	62,467
March	14	37,470	18	46,087
February	26	78,237	26	66,648
January	23	54,709	25	57,589
December	20	46,569	17	43,041
November	22	56,983	22	50,043
October	24	59,136	26	61,673
September	21	60,956	22	54,537
August	24	62,574	26	63,874
July, 1928	26	59,204	27	61,976

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	47	131,512	101	323,955
August	37	87,502	74	275,017
July	36	72,793	87	259,450
June	35	75,614	78	243,391
May	37	79,121	79	220,456
April	36	82,330	93	294,062
March	33	62,486	77	221,143
February	37	96,127	81	256,077
January	45	133.396	106	347,297
December, 1928	45	129,285	107	355,592

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
July, 1929	203	705,042	169	620,250
June	186	574,459	159	582,247
May	167	604,274	224	597,519
April	175	546,939	184	650,172
March	177	542,573	180	523,807
February	150	470,851	157	484,043
January	193	581,357	191	536,504
December	199	551.301	154	487.064
**November	209	541,906	179	514,647
October, 1928	221	568,910	216	515,889

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1929....	151	563,770	134	559,772
August	196	723,330	168	669,499
July	173	680,770	153	621,762
June	167	643,580	147	584,361
May	179	643,864	165	613,836
April	173	673,174	153	606,246
March	176	655,851	174	692,407
February	153	603,008	130	484,085
January	135	587,423	142	560,239
December, 1928	155	607,902	152	582,612

Port Arthur

(Including Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
May, 1929	22	76,344	26	87,941
April	21	79,267	23	81,991
March	25	76,152	27	81,778
February	16	53,310	21	68,705
January	22	68,758	24	76,496
December	21	65,710	14	43,776
November	23	71,313	23	69,425
October	19	58,857	19	58,686
September	22	73,785	24	79,696
August, 1928	25	78,765	23	72,389

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 61 of 208,641 net tons entered and 64 of 215,676 net tons cleared for the month of August.

Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let—Shipping Board Loans Made, Authorized or Pending

THE Kitsap Country Transportation Co., Seattle, has asked tenders for the building of two large passenger and auto ferries for service on Puget sound. These vessels are to be 200 feet in length, 57 feet beam, and depth 16 feet. Their capacity will be 1000 passengers and 90 automobiles each. Diesel engines have been specified for the power plants. The cost of the vessels is estimated at $500,000 by Capt. John L. Anderson, president of the company.

Launch Large Motorship

The American-South African line has prepared plans and specifications for another vessel of the same type as the motorship CITY OF NEW YORK which was launched Oct. 19 at the yard of the Sun Shipbuilding Co., Chester, Pa. It is the intention of the line to build two additional vessels ultimately.

The CITY OF NEW YORK, to which the new vessel is to be similar, is 470 feet 8 inches in length; her beam is 61 feet 6 inches, and the loaded draft is 26 feet. The craft will cost upward of $2,000,000 and is of 9400 deadweight tons.

Main propelling machinery is to consist of two Sun-Doxford opposed piston, double acting, solid injection diesel engines which will develop over 5000 shaft horsepower, with a cruising speed of 13 knots. Luxurious accommodations are to be provided for 60 passengers in first class.

Loan to Oceanic S. S. Co.

A loan to be used by the Oceanic Steamship Co. San Francisco in aid of constructing two combination passenger-cargo vessels designed to be operated in transpacific trade was approved by the shipping board Oct. 16. The loan will amount to three-fourths the construction cost of the vessels and interest will be provided at the minimum rates allowed in the Jones-White act. Contracts with the Bethlehem Shipbuilding Corp. for construction of the vessels have been drawn up, and it is anticipated that work will soon be started at the builder's Fore River yard, Quincy, Mass.

The ships will be passenger-cargo carriers of 11,300 deadweight tons and capable of approximately 20 knots speed. They will be propelled by twin screws operated by single reduction gear turbines.

Loan for New Tankers

The shipping board Sept. 25 approved a loan amounting to $6,304,687.50 to be used by the Motor Tankship Corp. in aid of constructing five motor tankers of approximately 13,450 deadweight tons each. The vessels are to be built by the Sun Shipbuilding and Dry Dock Co. at Chester, Pa.

Repayment of the loan which amounts to three-fourths the cost of the ships is to be in 20 equal annual installments, with interest payable semi-annually.

The vessels will be of approximately 18,900 tons displacement, and capable of approximately 11 knots speed.

The Universal Portland Cement Co. is planning the construction of a new vessel to be operated in the cement trade on the Great Lakes.

Contract for New Ferry

Contract has been awarded the United Dry Docks Inc., for the construction of a new oil-burning ferryboat for the New York-Staten Island service. The successful bid was $950,000. The keel of the new boat, which will be sister ship to the DONGAN HILLS placed in service last June, will be laid Dec. 1.

The boat will be 267 feet long, 66 feet beam over guards and 46 feet for hull alone, 19 feet 9 inches deep and with draft of 12 feet, 6 inches. There will be two decks with accommodations for 1650 passengers and two gangways for 32 vehicles.

Two-cylinder double fore and aft compound engine, rated at 4000 horsepower capable of driving the boat at 18 knots will provide main propulsion. There will be four Babcock & Wilcox water tube boilers.

New Panama Mail Tonnage

The Panama Mail line has under consideration construction of one or two 18-knot passenger and cargo liners as a result of its application to the Post Office department for a contract for carrying the mails between San Francisco and Puerto, Colombia. The company may add other vessels if the terms of the mail contract are sufficiently attractive to warrant it.

Tanker for Tide Water

Construction is soon to begin on a second coastwise, diesel-electric tanker for the Tide Water Oil Co. to carry gasoline and lubricating oil. Like the first boat, her capacity will be approximately 20,000 barrels of gasoline and approximately 55,000 gallons of lubricating oil, the latter to be carried in individual tanks in the forward hold space.

The new boat, with the exception of minor changes, will be a duplicate of the first, built during 1929 and now in service. The hull will have the Isherwood type of frame construction and is being built and equipped by the Pusey & Jones Corp. of Wilmington, Del. The vessel will have a length of 255 feet, a beam of 44 feet, a draft of approximately 15 feet 6 inches, and a deadweight tonnage of about 2400 tons. The diesel engines will be built by I. P. Morris & De La Vergne, Inc. The generators and other electric equipment will be furnished by the General Electric Co.

In addition to the two main generators there will also be three auxiliary generators, each rated 45 kilowatts, 240 volts, compound wound. Two of these generators will be mounted on shaft extensions of the main generators, and the third will be direct connected to a three-cylinder, solid-injection, Winton engine.

The propulsion motor will be a double-unit machine rated 1000 shaft horsepower, 130 revolutions per minute, 500 volts. It will consist of two 500-horsepower, 130 revolutions per minute, 250-volt motors mounted on a common shaft witht two bearings and base.

The P. & O. Steam Navigation Co. have prepared specifications for two first class passenger liners which are to be similar to the VICEROY OF INDIA. The new vessels are to have turbo-electric propulsion machinery.

Sinclair Builds Tankers

The Sinclair Consolidated Oil Corp., through its subsidiary, the Sinclair Refining Co., has signed a contract with the Bethlehem Shipbuilding Corp., the successful bidder, for two 8400-deadweight-ton steel tankers. These boats will be named the HARRY F. SINCLAIR, JR. and the VIRGINIA SINCLAIR, after the two children of H. F. Sinclair, chairman of the board of directors of the Sinclair company.

The new tankers are primarily for carrying clean or refined products from Gulf ports to refineries and terminals of the Sinclair Refining Co., on both the Gulf of Mexico and the Atlantic seaboard.

Two self-propelled coastal barges for delivering gasoline along the coast will also be ordered by the Sinclair company from the Bethlehem company.

The specifications were developed by the Sinclair Navigation Co. The new tankers will have the following general characteristics: Length over all, 431 feet; length between perpendiculars, 416 feet; breadth molded, 57 feet; depth molded, 32 feet.

The vessels are designed to carry 8400 tons deadweight on a draft of 24 feet. The speed, fully laden, will be approximately 13 knots.

Machinery will consist of De Laval cross compound geared turbines with double reduction gears, 4000 shaft horsepower, 75 revolutions per minute, operating on an overall heat rate not exceeding 14,500 b.t.u.'s per shaft horsepower per hour, Steam will be furnished by three Babcock and Wilcox water tube boilers fitted with approved mechanical oil burning system, etc. for a steam pressure of 350 pounds per square inch and 200 degrees Fahr. superheat, 28½ inches vacuum measured at the exhaust with the barometer at 30 inches. The auxiliary machinery will be of special type, embracing the latest design in engineering efficiency and all modern aids to navigation will be furnished, including Sperry Gyro-Compass, metal micraphone, and radio direction finder.

Standard Oil Tankers

The Manitowoc Shipbuilding Co., Manitowoc, Wis. has received an order from the Standard Oil Co. of Ind. for a tanker which is to be similar to the ROBERT W. STEWART, completed in April of 1928. The new vessel is to be 400 feet at keel, 53 feet 3 inches beam, and 27 feet in depth.

The Lackawanna railroad has placed orders for 10 refrigerated barges and 10 gas hoists. The new vessels are to be 105 feet long with a beam of 33 feet.

Dollar Line Contracts Let

Loans in aid of constructing two 20-knot combination passenger and cargo turbo-electric steamers of approximately 33,000 tons displacement were awarded the Dollar Steamship line, Inc., by the shipping board Sept. 25. The loans will amount to $5,287,500 each, or three-fourths the cost of each vessel, whichever shall be the lesser, and the funds are to be advanced at the minimum interest rates provided in the Merchant Marine act of 1928. Repayment will be made in 20 equal annual instalments.

The vessels are to be built by the Newport News Shipbuilding and Dry Dock Co., Newport News, Va., with which concern the Dollar line already has entered into contractual relations for their construction. The first of the two ships is to be completed by Oct. 1, 1931, and the second by Feb. 1, 1932.

When completed the vessels will be placed in the Dollar Round-the-World line, which was the first shipping board passenger service to be transferred to private ownership. The Dollar company now has seven vessels of somewhat smaller size and lower speed than the proposed new ones.

The Reading Co. is taking bids on the construction of six carfloats.

(*See Page* 102 *for Additional New Work Items*)

Ship Construction Loans Made, Authorized or Pending

Loans Made to Date

Minnesota-Atlantic Transit Company, Duluth to New York via Erie Canal; Twin Cities, Twin Ports, two ships (Diesel), $400,000.

Eastern Steamship Lines, Inc., Boston to New York; Boston-New York, two passenger-cargo vessels, $1,825,000.

Robert E. Lee Steamship Corporation (subsidiary of Old Dominion Steamship Company), Atlantic coastwise service; Robert E. Lee, one passenger-cargo ship, $1,000,000.

Cherokee-Seminole, Steamship Corporation (subsidiary of Clyde Steamship Company), Atlantic coastwise service; Cherokee-Seminole, two passenger-cargo ships, $2,618,000.

Coamo Steamship Corporation (subsidiary of New York and Porto Rico Steamship Company), North Atlantic and Caribbean service; Coamo, passenger-cargo ship, $1,462,500.

New York and Miami Steamship Corporation, New York and Florida service; Iroquois, Shawnee, two passenger-cargo ships; $2,396,000.

American Line Steamship Corporation, New York to San Francisco, California; one passenger-cargo ships; $3,000,000.

Eastern Steamship Lines, Atlantic Coastwise Service, Yarmouth, Evangeline; two passenger-cargo ships; $1,800,000.

Cherokee-Seminole Steamship Corporation, Atlantic Coastwise Service; Algonquin, passenger-cargo ship; $952,500.

American Line Steamship Company, New York to San Francisco; Virginia, passenger-cargo ship; $3,500,000.

Dollar Steamship Company—Plans and specifications submitted for first class passenger vessels for round-the-world service; plans reviewed by the different departments and loan for construction has been submitted; application understood to be dependent on a mail contract.

Loans Authorized

Export Steamship Corporation, American Export Lines, New York to the Mediterranean, four ships, interest rate 3⅜ per cent; $6,900,000.

Atlantic Gulf and West Indies Steamship Company, Ward Line, New York to Havana, two ships, interest rate 3⅜ per cent—$6,525,000.

Grace Steamship Company, Grace Line, New York to West Coast of South America, one ship, interest rate 3⅜ per cent—$2,454,750.

American South African Line, New York to South African ports, one ship, interest rate 3⅜ per cent—$1,350,000.

American Line Steamship Corporation, Panama Pacific Line, New York to San Francisco, one ship, Pennsylvania, interest rate 5¼ per cent—$5,250,000.

Oceanic Steamship Company (Matson Line) has received a loan to build two or three vessels; plans and specifications approved; prices submitted satisfactory; company for a time delayed final request pending decision regarding a mail contract from San Francisco to Manila.

Loans Pending

Di Giorgio Fruit Corp.—Has submitted preliminary application for a loan in aid of the construction of two combination freight and passenger vessels; approved by committee on construction loans; formal application understood to await settlement of the question of a mail contract.

Columbian Steamship Co.—Soon after enactment of the Merchant Marine act, 1928, company applied for a loan to construct three combination passenger and cargo vessels; consideration of loan held up at request of company because of the uncertainty of a mail contract.

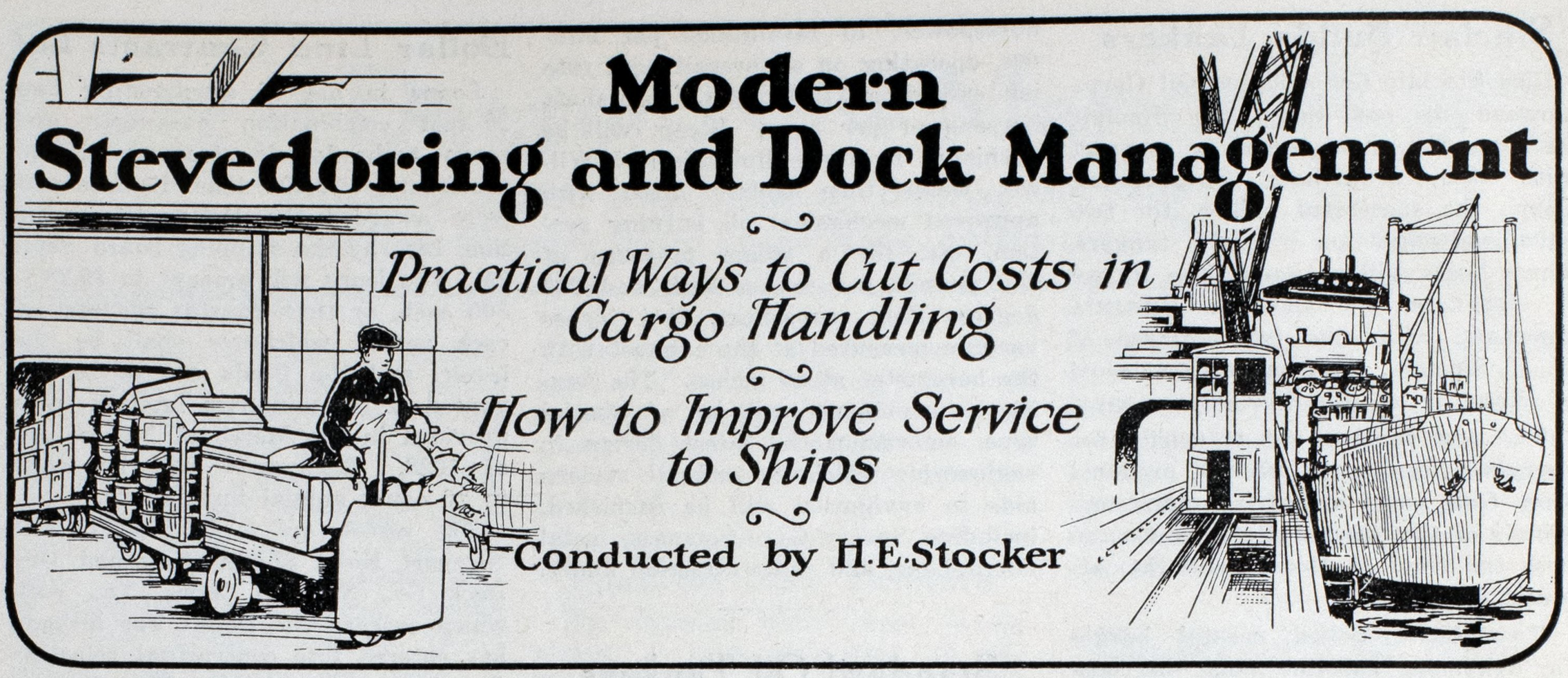
New York and Porto Rico Steamship Co. (Coamo Steamship Corp.)—Has applied for a loan to aid in construction of a combination passenger and freight vessel substantially similar to steamship Coamo; plans and specifications not received and no progress can be made until they are submitted.

Flood Lines, Inc.—Has applied for loan to aid in the installations of Diesel engines in a vessel purchased from the Shipping Board application being carefully considered.

Lykes Bros. Steamship Co. has applied for construction loan to aid in improvements and betterments to one vessel in service; loan being actively considered.

Leatham Smith-Nacco Steamship Co., Inc., preliminary application for loan for converting the steamer Oakhurst to a self-unloading bulk cargo carrier and in making certain improvements to the vessel and its machinery; applicant has sought to substitute another vessel for the Oakhurst; case awaits receipt of further advice from applicant.

American Tankers Corp., preliminary application received for loan for converting collier Ulysses to tanker; being actively considered.



Handling Shipments of Pulpwood By Latest Improved Methods

By Daniel W. Coe

OWING to the fact that many of the large paper manufacturers are now compelled to bring their supply of pulpwood from timber limits remote from their mills, water transportation is employed wherever possible as the freight charges are much lower than for rail transportation. Therefore marine shipments are rapidly increasing in volume and the industry is consequently looking about for improved methods which will speed up the operations and lower the cost for loading and unloading cargoes of pulpwood.

The scope of this paper is limited to a description of the methods of loading and unloading marine cargoes of pulpwood, which are radical departures from the common practice hitherto employed.

At Port Menier, Anticosti Island, there is in operation a system of loading vessels which is a radical departure from the common practice employed up to the year 1927. During the season of 1928, there probably was shipped from the single loading pier at Port Menier in the neighborhood of 400,000 tons, or about 180,000 cords of 4-foot pulpwood with the bark on.

A loading pier 55 feet wide and 600 feet long has been built to provide berths for two pulpwood steamers on one side. On the opposite side and parallel with the pier is a pulpwood concentrating basin having an area of 40 feet in width, and the same length as the pier. As the ends of the basin are closed the area is thus restricted and the pulpwood fed thereinto will be in concentrated form.

In other words, there will be floated several layers of wood reaching a depth of about 4 feet instead of the usual single layer of logs found in the ordinary boom or basin. (See Fig. 1.)

The wood is fed into this concentrating basin direct from the slashers (which cut up the 12-foot and 16-foot logs) by means of a multiple chain distributing conveyor system equipped with a movable plough for throwing off the logs at any point in the length of the basin.

The author, Daniel W. Coe, is vice president and general sales manager, Canadian Mead-Morrison Co. Ltd. Presented before the American Society of Mechanical Engineers, Oct. 1, 1928, at Boston.

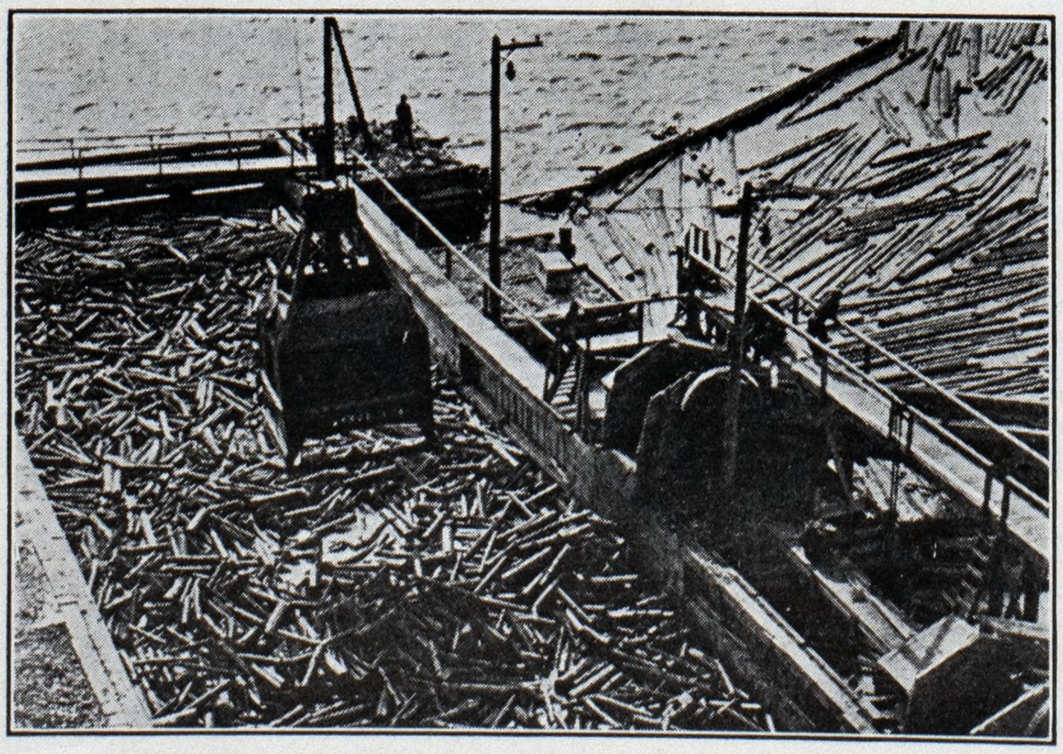


FIG. 1—CONCENTRATION BASIN FOR 4-FOOT PULPWOOD

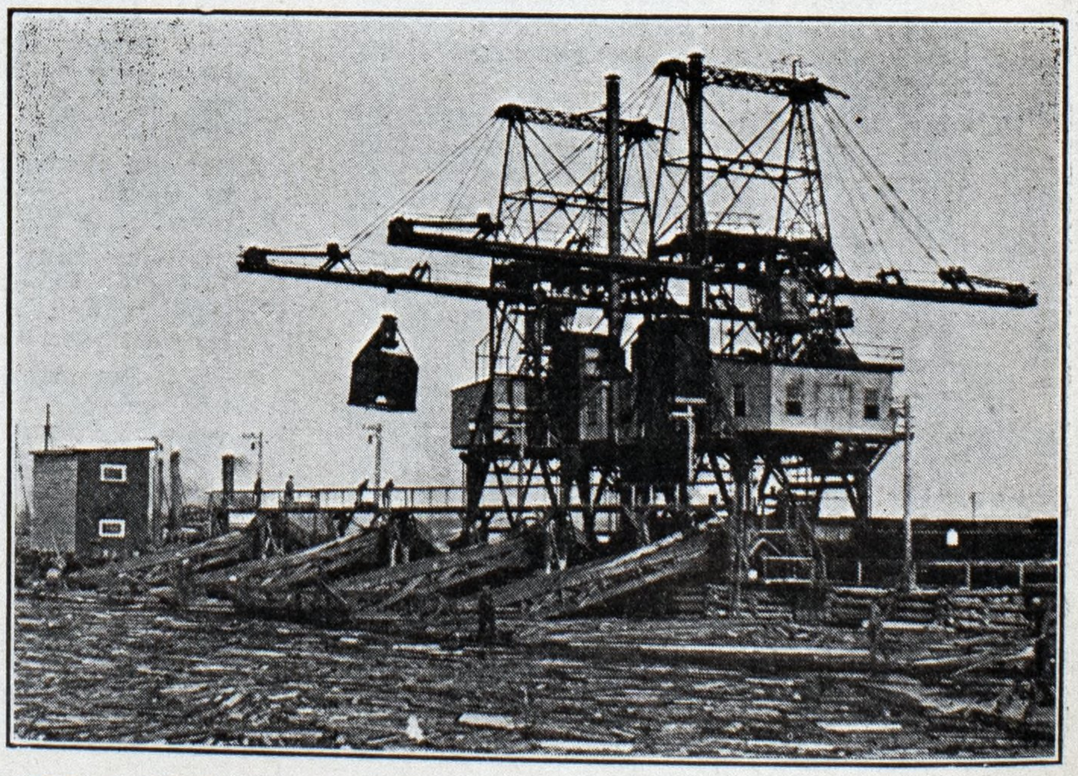


FIG. 2—PULPWOOD LOADING TOWERS, ANTI COSTI ISLAND

In the event that the concentrating basin is completely filled with logs to a depth of 4 feet at a time when pulpwood is not being withdrawn therefrom for loading steamers, slashing is continued as the plough may be quickly raised, thus permitting the logs to pass to the end of the distributing conveyor where they are dumped off into the reserve storage boom for 4-foot wood. This reserve boom is adjacent to the concentrating basin and as required the logs are taken therefrom by jack ladders and again loaded on the multiple chain conveyor for distribution to the concentrating basin. This arrangement insures a steady supply of wood for loading steamers in the event of temporary interruption of the slasher operations or shortage of 12-foot and 16-foot log supply to the slasher.

Mechanical Equipment on Pier

On the steamer loading pier above described are two self-propelled steam-operated hoisting towers, Fig. 2, with through-type booms and equipped with "pulpwood trappers," having a capacity of 1 1/5 cords, for taking the 4-foot wood from the concentrating basin and loading it into the holds of the steamers or on their decks. The towers are similar to the familiar coal and ore unloading towers, but in place of the grab bucket a pulpwood trapper is provided. This trapper, a rectangular caisson or box with an open bottom, is 8 feet wide, 10 feet long and 16 feet high. The lower portions of the longer perpendicular sides are hinged, and when the trapper is lowered in the open position into the concentrating basin, its own weight permits it to penetrate quickly the concentrated logs until the hinged portions of the two longer sides are below the lowermost level of the logs. When these hinged portions or doors are then brought together with but little resistance it will be seen that the wood held in suspension by the water and enclosed by the sides of the box has been trapped. The trapper is now ready to be hoisted, traversed along the tower boom, and its load lowered and delivered to either the hold or deck of the steamer for stowing. (See Fig. 3.)

There are three lines of railroad tracks on the loading pier, two of them passing under the portaled towers and one running alongside the concentrating basin for the purpose of dumping therein any 4-foot logs which may be brought to the pier on the railroad cars.

As stated, two steamers berth on one side of the pier, and as each tower has a capacity of up to 90 cords per hour the loading of the two steamers is carried on simultaneously, each tower serving one steamer. At present, an average of seven steamers, each of about 1400 cords capacity (800 in the hold and 600 on deck) are engaged in transporting wood from Anticosti Island to Three Rivers, 420 miles distant, and to Port Alfred, 275 miles distant. Each steamer has six hatches at least 12 feet in width, and as the loading of the hold progresses the tower moves from hatch to hatch depositing the pulpwood wherever desired for convenient handling by the stowers.

The deck load of some 600 cords is loaded in a similar manner; the tower placing the wood in any desired position on the deck. The advantages of this system are:

1. Maximum safety for stowers, there being no logs thrown or tossed about, a condition that frequently occurs when chuting wood into the steamer.

2. Minimum fatigue for stowers, as wood is discharged at convenient points and in thin layers thus facilitating the stowing operation.

3. Greater stowing capacity per man.

4. Elimination of damage to steamers caused by chuting logs from a considerable height.

5. Simplicity of dock construction, loading equipment, etc., which permits the same dock to be used for various other purposes such as unloading or loading out other cargoes.

The steamers at Anticosti Island, carrying about 1400 cords of pulpwood, discharge their cargoes at Port Alfred, Cap de la Madeleine, and at the Wayagamack dock. At Port Alfred and Cap de la Madeleine the unloading installations are similar and consist of two self-propelled electrically operated unloading towers operating on docks specially built for this purpose. (See Fig. 4) Each tower is provided with six light steel unloading skips of 1½ cords capacity, as shown in Fig. 5. The skips, 6 feet wide, by 7 feet long, by 4 feet high, are open at both ends for convenience in loading. Each tower handles six skips which when loaded are quickly and safely attached to the dumping frame at four points by means of large rings held in place by safety spring bolts. The skips when hoisted always remain in a horizontal position, thereby preventing any possibility of the logs falling out and causing accidents. When the loaded skip is traversed along the boom trackway on the tower it remains in a horizontal position until it reaches the portion of the trackway at the back of the tower where the wood is automatically discharged. This is accomplished through the special arrangement of boom tracks which permits the front wheels of the trolley to drop down and the rear wheels to ascend, so that the trolley, the dumping frame, and the skip are quickly inclined to an angle of

(*Continued on Page* 104)

FIG. 3—TRAPPER DISCHARGING PULPWOOD INTO HOLD OF STEAMER

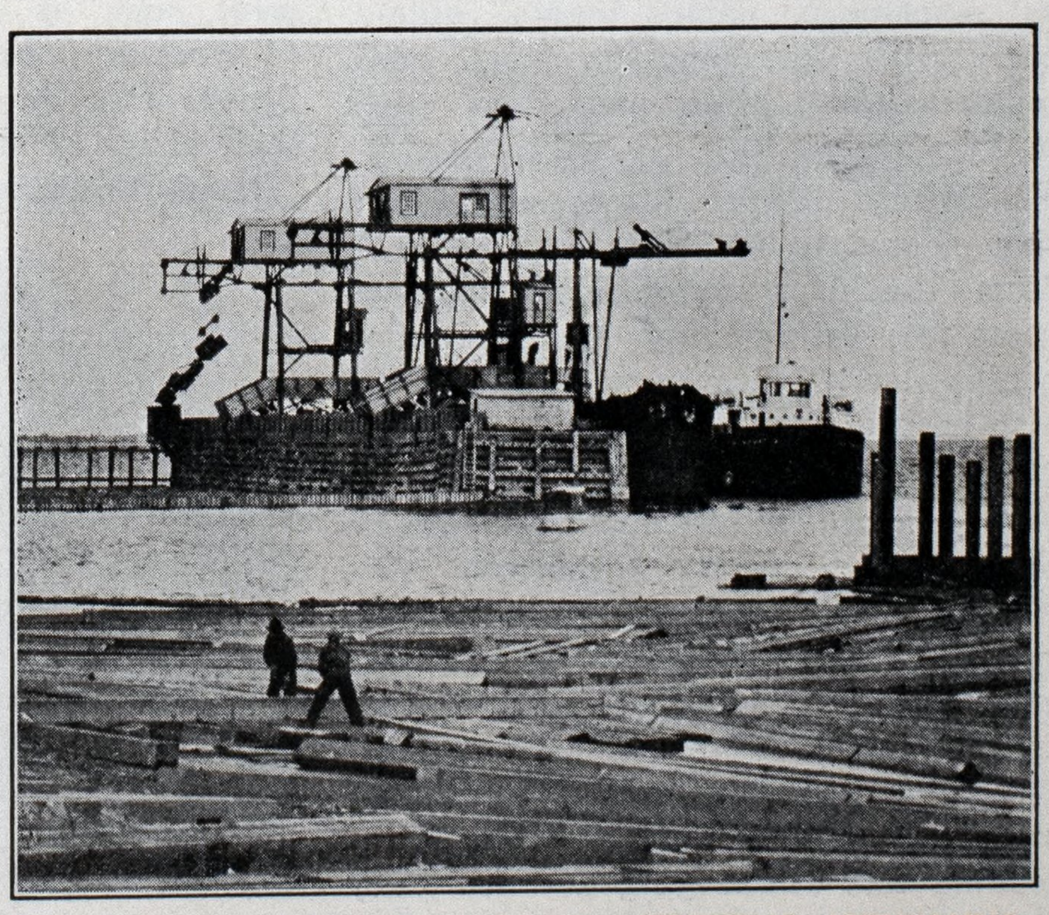
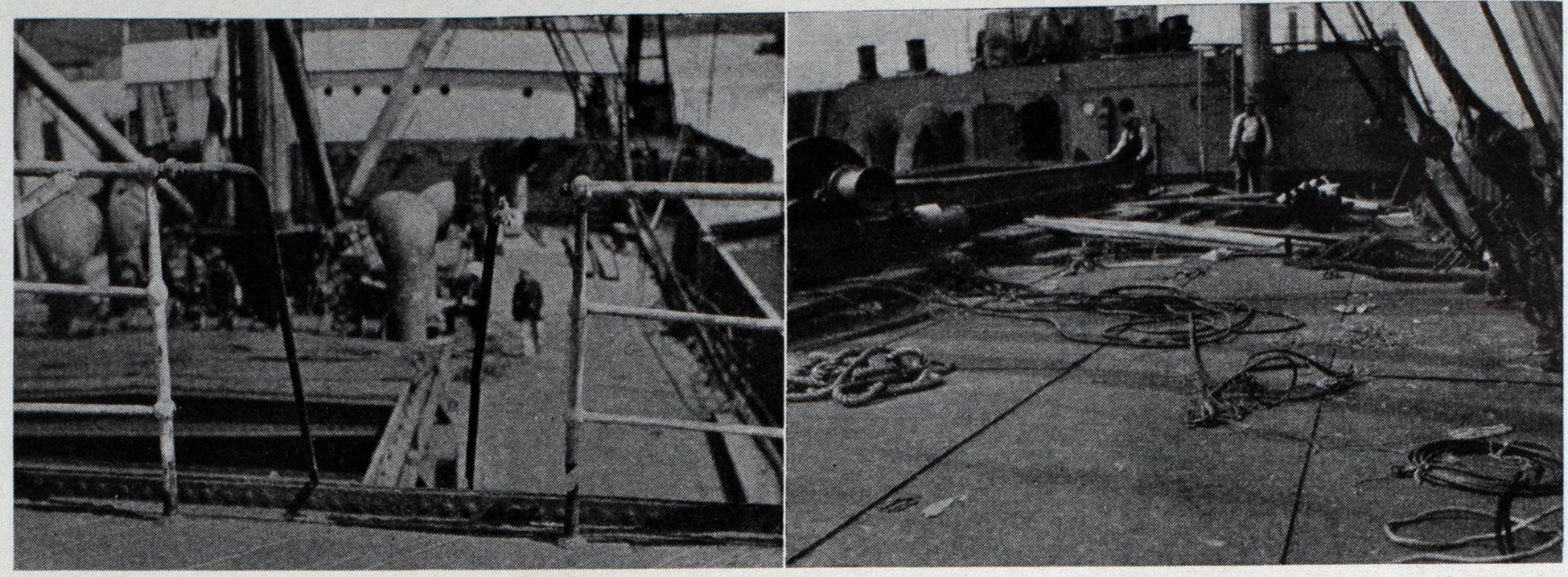


FIG. 4—TWO UNLOADING TOWERS SHOWING AUTOMATIC DUMPING SKIP DISCHARGING 1½ CORDS OF PULPWOOD INTO STORAGE BASIN



Left—Unrepaired Broken Rails are Unsafe. Right—A Cluttered Deck Causes Accidents

Safety Engineering as Applied on Marine Terminals

By M. E. Arkills

SAFETY is claiming the attention of those interested in cargo handling more than ever before. The universality of compensation insurance has done much to impress these men by way of the cost sheet, just how important it is to prevent injuries.

The physical condition and the arrangement of a port terminal are important, although not of first importance. Some of these conditions that effect safety follow:

1. A wide apron equipped with standard gage track for direct loading or discharging of heavy lifts, such as machinery, cable, ingots, billets, etc. Also for handling steel, coal, molders sand, glass sand and other bulky cargo.

2. Where depressed tracks are used they should be at least 100 feet back from the dock apron. This allows room for sorting cargo and for ramps equipped with escalators. There should also be room for motorized haulage of cargo on the dock.

3. Tractors or car pullers should be on each dock for the purpose of moving cars. These should never be pulled with ship's falls. It is, however, quite safe to pull with hawser winches.

The use of escalators or dock elevators at ship's side for side port loading and discharging are necessary where tidal variations are great. Escalators should be so constructed that longshoremen would not easily fall from them while riding. They should not excessively speed the workmen at the point of delivery, nor should there be any opportunity of catching the heels or feet of those who ride them. An operator should always be at the control switch of the motor.

Ship side elevators should be fast working, equipped with automatic gates and in charge of a competent operator.

The operator of other dock equipment such as hand trucks, buggies, (4 wheelers), and gasoline or electric jitneys (tractors), should come in for their share of attention.

Hand trucks should be solidly constructed with good bearings in the wheels. All hand trucks should be equipped with good brakes to assist in picking up the load without endangering the feet of the workmen.

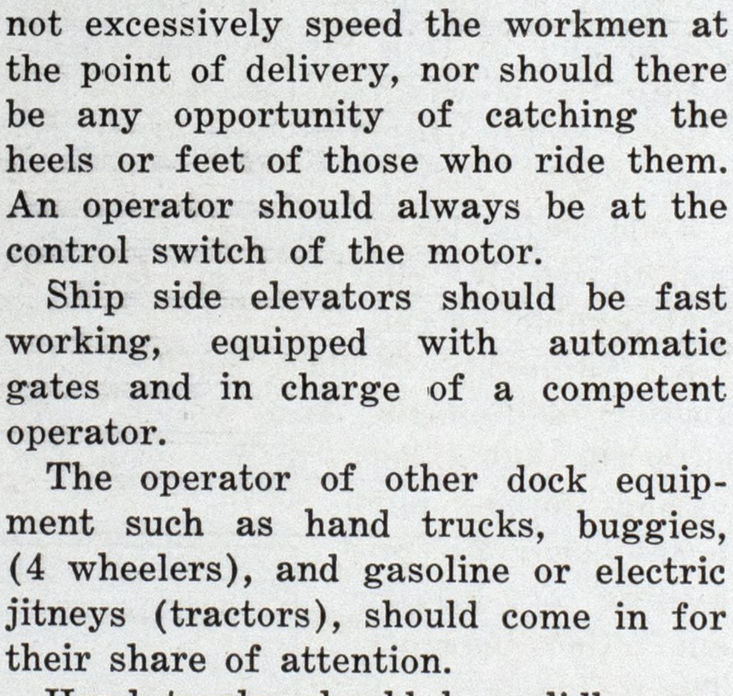
The tongue of the buggie should be so shaped that it would lay flat on the floor when not in use to remove tripping hazard. The buggie should be so constructed that it will not tip over easily.

Gasoline jitneys, will, like the automobile, require certain well defined standards if they are to be operated safely. There should be no horn. The driver is in control of the power and should carry his own responsibility for such operations and not expect every one else to stop work to see him perform. The jitneys must have good brakes and have a short turning radius. The electric jitney has practically the same requirements as the gasoline jitney.

A cluttered dock is conducive to personal injuries. Keeping the dock in proper order has to a great extent eliminated tripping, falling, and the inability to get out of the way of drafts and other hazards.

Poorly fitted hatch covers, or broken hatch covers are a serious hazard. Progress has been made in eliminating this hazard by correspondence with ship owners and agents, and by the education of the foreman. These are

(*Continued on Page* 106)



Handling Cargo by Hand Instead of Mechanically Increases Accidents

The author, M. E. Arkills, is safety engineer of the Seattle Waterfront Employers' association.

Up and Down the Great Lakes

Lake Michigan Trade—Lake Levels—Lemoyne Breaks Record—Four Steamers Sold—Prominent Operator Dies—Grain Storage Boats—Winter Schools

HOW traffic of the ports at the lower end of Lake Michigan has been expanding is illustrated in figures just made available by the United States engineer's office at Chicago. The data show that last year the incoming and outgoing lake shipments from the ports extending from Waukegan, Ill., to Michigan City, Ind., expanded by about 12,000,000 tons over the preceding year.

Shipping tonnage in the Calumet river and harbor, which amounted to 11,500,000 in 1927, grew almost to 16,000,000 in 1928, the value reaching about $81,000,000. The port of Chicago, which includes South Chicago and the area touching the Chicago river, increased from 14,095,519 tons to 17,808,925 tons.

Of the entire 1928 shipments of the port of Chicago, about 14,500,000 tons were incoming and the remainder outgoing. In 1928, shipping tonnage at Indiana Harbor, Ind., amounted to 7,359,522 tons, valued at $54,000,000, against 5,787,919 tons, valued at $40,000,000, in 1927.

Ore and coal for steelworks operations supplied the bulk of the water traffic in the southern part of the Chicago metropolitan area.

Tonnage at Gary, Ind., comprised largely of iron ore, coal and limestone, grew from the 1927 figure of 5,396,985 tons to 7,231,643 tons. The products shipped increased in value from $18,000,000 to $24,000,000. Shipments of Buffington, Ind., composed largely of cargoes of cement manufacture, grew 300,000 tons, while the tonnage of Waukegan, Ill., increased by 200,000 over 1927, these shipments having been largely coal.

Milwaukee tonnage in 1927 was in excess of 8,000,000, and the total increased by a comfortable margin in 1928. Figures on Ludington and Muskegon, Mich., and Milwaukee are not available now for 1928, but all had an upswing in tonnage during the year. About 25 per cent of Milwaukee's shipping was car ferry movement. The percentage of car ferry movement for Ludington and Grand Haven, Mich., was similar to that of Milwaukee.

Shipments of finished steel from the East gained about 15 to 20 per cent in 1929, as compared with the preceding year, and gains also are being shown in the shipments of sugar from New York and Philadelphia, and in receipts of newsprint paper.

A cargo of low phosphorus iron and another cargo of spiegeleisen were shipped direct from England to Chicago and Milwaukee this year, while a number of barge loads of sugar have come in the same bottoms from Philadelphia to docking facilities at Chicago district ports.

September Lake Levels

The United States Lake survey reported the monthly mean stages of the Great Lakes for the month of September as follows:

Lakes	Feet above mean sea level
Superior	602.91
Michigan-Huron	581.83
St. Clair	576.44
Erie	573.36
Ontario	247.45

Lake Superior was 0.02-foot lower than in August, and it was 0.37-foot lower than the September stage of a year ago. Lakes Michigan-Huron were 0.35-foot lower than in August, and they were 1.39 feet higher than the September stage of a year ago. Lake Erie was 0.45-foot lower than in August, and it was 1.22 feet higher than the September stage of a year ago, 1.44 feet above the average stage of September of the last ten years. Lake Ontario was 0.55-foot lower than in August, and it was 1.28 feet higher than the September stage of a year ago, 1.92 feet above the average stage of September of the last ten years.

New Life Saving Boats

Two new life boats which have been reported the finest on the Great Lakes have been added to the coast guard service on Lake Superior. One vessel is to be stationed at Marquette and the other at Grand Marais, Minn. The boats were built at Curtis Bay, Md. They are 36 feet long, ten feet beam and draft three and one-half feet. They are to derive their power from a 100 horsepower six cylinder Sterling engine.

Four Steamers Are Sold

The Youngstown Steamship Co. of which Pickands, Mather & Co. are managers, closed a large vessel deal with the Stewart Furnace Co. Sept. 28 when it purchased four freighters which were operated by Harvey H. Brown & Co. for the former owners. The vessels which figured in the sale were the steamers HARVEY H. BROWN, ELTON HOYT II, FAYETTE BROWN and HARRY W. CROFT. The price was not made public. The vessels which have a carrying capacity of 40,000 tons per trip were taken over at once by the Youngstown Steamship Co. and were placed in operation in the ore, coal and grain trades. This sale will add four vessels to the fleet operated by Pickands, Mather & Co., the second largest vessel operating company on the lakes, making the line's total 49 carriers.

Lemoyne Scores Again

The steamer LEMOYNE of the Canada Steamship lines, recently carried the first load of grain out of Fort William for Port Colborne in many weeks, creating another record of 571,796 bushels. This beats her previous record of 567,000 bushels, made in June, by a considerable margin. The LEMOYNE also holds the world's record for a coal cargo, having carried 16,557 tons in May.

This cargo beats the previous record held by the steamer HARRY COULBY of Ashtabula by 620 tons.

A record delivery of grain to be shipped out of the Montreal harbor since the middle of July was made Oct. 8. The total shows that 849,919 bushels left the port during the 24-hour period, Oct. 7-8. At that time 45 vessels loaded with grain were awaiting unloading.

Grain Storage Boats

Twenty-two vessels holding winter storage grain were tied up at Buffalo the middle of October. This is the largest number of storage boats ever to be tied up at this port so early in the season. Based on present numbers there is sufficient justification for the opinion that the fleet of grain storage boats at Buffalo this winter will be the largest in history. The boats in the lineup at Buffalo elevators on Oct. 12 carried 666,000 bushels. At this

time twelve vessels were enroute to this port with cargoes of 2,695,000 bushels of grain. Brokers have estimated that more than 30 vessels including a number of large carriers will be holding grain at both Duluth and Buffalo by the end of October.

Divide Chicago District

The Chicago federal engineering district has been divided into two parts by the war department, which has placed Lieut. Col. William C. Weeks in charge of the newly created first district, with the lake diversion, Illinois waterway, drainage canal, Kankakee and Fox river projects under his jurisdiction. Maj. Herbert J. Wild is in charge of the second district. Under the latter's jurisdiction will be the Chicago river and harbor, the Calumet canal and harbor of Michigan City, Ind., and the harbors of Gary and Buffington, Ind., and Waukegan, Ill. Growing importance of the federal engineering projects in the Chicago area made necessary the changes, it was stated.

Structural Steel Work

The American Ship Building Co. will engage in structural steel work this winter at its Lorain plant. Announcement was made by W. H. Gerhauser, president of the company who stated that his company had received several large orders which will be taken care of in addition to the customary repair of lake boats during the winter. Quite a number of new items of mechanical equipment have been installed at the Lorain plant for use in the company's new venture.

Build Steel Breakwater

A large steel breakwater has been constructed in the harbor at St. Joseph, Mich., to protect the shore bluffs from the high waters of Lake Michigan. The breakwater is about 400 feet long.

Canadian Bulk Freighter Is Launched

THE steamer STADACONA, building by the Midland Shipbuilding Co., Midland, Ont., for the Canada Steamship Lines Ltd., Montreal, was launched on Sept. 26 and was christened by Mrs. T. R. Enderby, wife of the general manager of the Canada lines.

The new freighter is 596 feet overall, 582 feet between perpendiculars, 60 feet molded breadth, 32 feet molded depth, and will have a carrying capacity of 400,000 bushels with a speed of 12 miles an hour, loaded.

The cargo hold is divided into six compartments with 18 hatches spaced 24 feet centers. All hatches have telescoping steel covers operated by two electric winches.

Steam will be supplied by three Scotch boilers 15¼ feet in diameter by 11½ feet long, having a total heating surface of 9042 square feet. The boilers are designed for a working pressure of 190 pounds per square inch, each boiler fitted with three furnaces. Forced draft has been installed.

The propelling machinery consists of a vertical triple expansion engine, with cylinders 24½, 41½ and 72 inches diameter by 48-inch stroke. The engine is arranged with three back and three front columns, fitted with ahead and astern slipper guides and the connecting rods are of the heavy fork type nine feet between centers. The crossheads are solid steel forgings, fitted with adjustable slippers lined with white metal on both ahead and astern faces. The usual type of horse shoe thrust bearing is used, there being nine collars, water cooled inside and running in an oil bath.

The stern tube is of heavy cast iron design fitted with brass bushes lined with lignum vitae, two lengths, to permit of easy withdrawal and renewal of the wood liners. The propeller shaft is 15⅛ inches in diameter and the propeller is of sectional type with four blades and is 16 feet in diameter by 18 feet pitch.

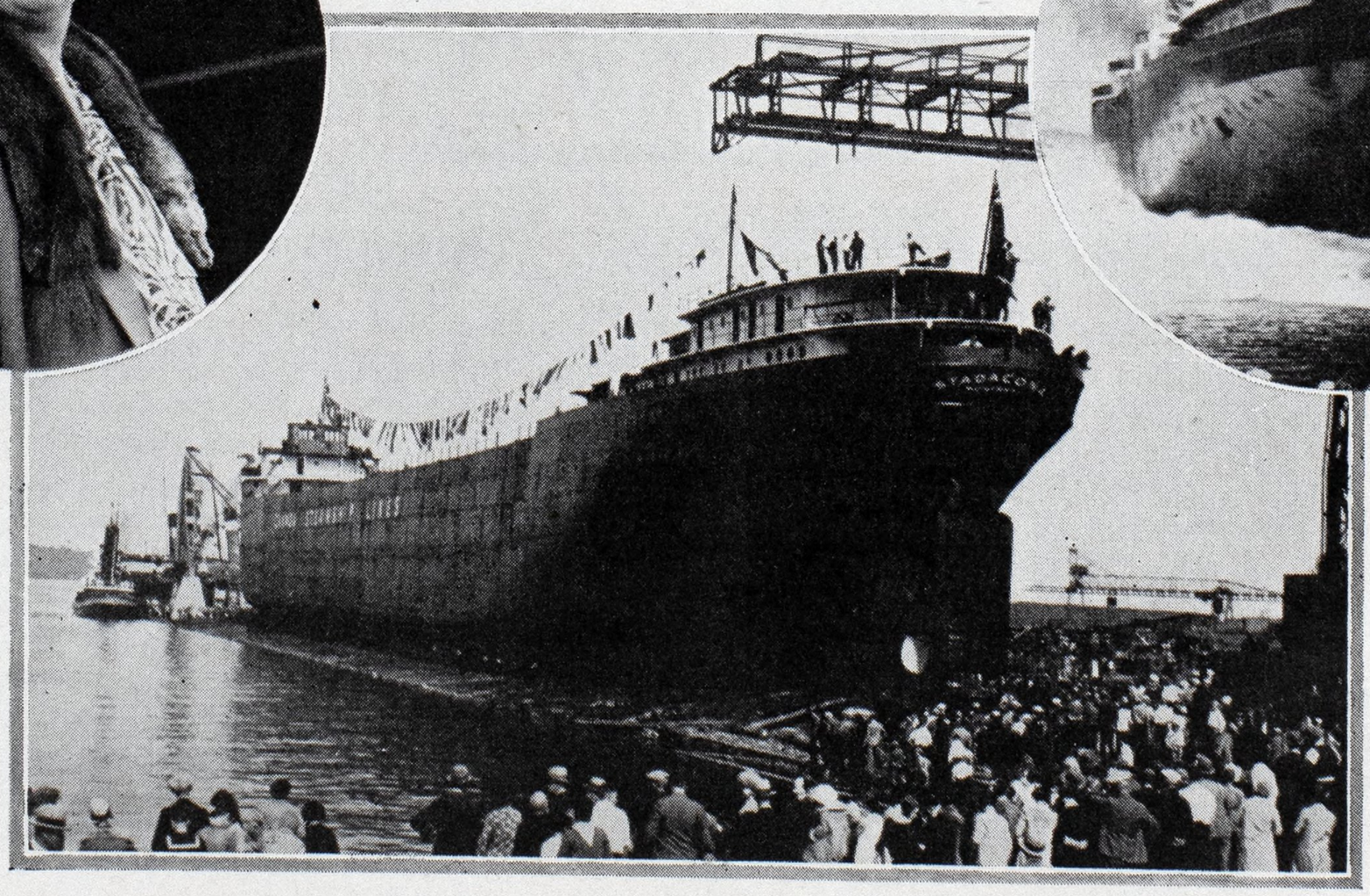
All pumps are independent of the main engine. The air pump is of the vertical simplex type, directly connected to jet condenser, and the two main ballast pumps are of the centrifugal type. The cargo hold can also be flooded and used as ballast in rough weather, two filling and emptying pipes being connected to it from the manifolds in the engine rooms.

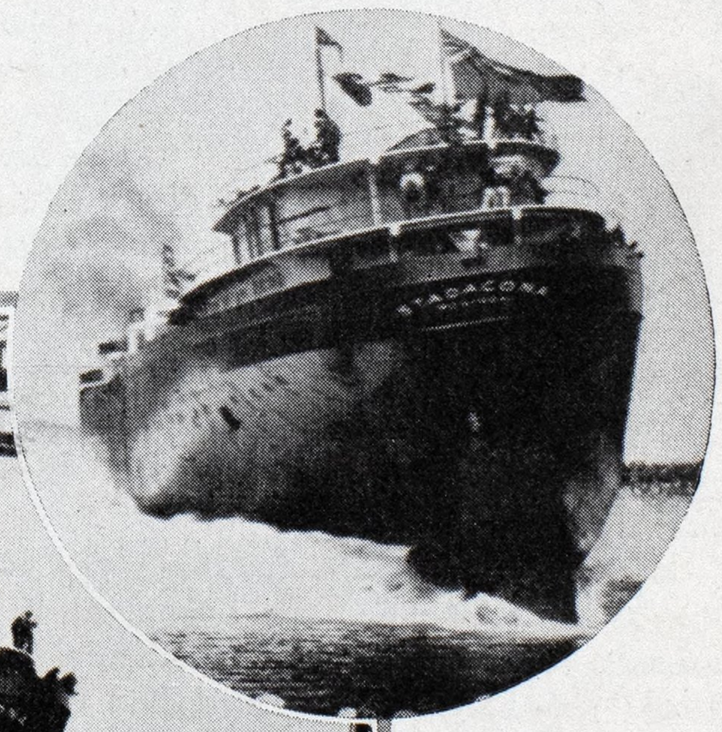
Above—

Mrs. T. R. Enderby, who acted as sponsor

Right—

Stadacona on the launching ways





Above—

Stadacona slips sideways into Georgian Bay

There are two auxiliary ballast pumps of the horizontal duplex type and two main feed pumps of vertical simplex type.

All auxiliaries and equipment electrically operated are as follows: Mooring winches, hatch winches, windlass, whistle control, engine and docking telegraphs, searchlight, Gyro compass, wireless and a complete telephone system.

Accommodations for officers and crew are spacious and well furnished. The "STADACONA" will carry a crew of 36 and will be commanded by Capt. F. Davies, now on the steamer WESTMOUNT, and the chief engineer will be J. McGregor now chief on the steamer DONNACONA.

Lake Carrier Schools

Free schools in navigation and marine engineering are to be conducted by the Lake Carriers association at Cleveland and Marine City, according to a long established policy of the educational committee of the Welfare Plan. The date of opening for both schools has been set for Thursday, Jan. 2. Application forms for enrollment in the schools will be sent to the ships with the September and October issues of *The Bulletin*. These applications must be returned on or before Nov. 30. Requirements of the Lake Carriers association provide that students be members in good standing of the Welfare Plan and that they be *eligible* for United States steamboat inspection service examinations which require: (1) that the applicant be a citizen of the United States, (2) that he be eligible for an original license as pilot and show a service record of 24 months in the deck department of a Great Lakes vessel; (3) that he be eligible for an original license as marine engineer and must show 36 months of service in the engine department, not including coal passing.

Wheat Shipments Less

According to the report of the Lake Shippers Clearance association, there was a big decrease in shipments of wheat from the head of the Lakes for September this year compared with the same month a year ago. The report gives the tonnage for this year in the trade as 17,252,927 bushels. Only 5,448,077 bushels were carried in vessels of United States registry. Combined shipments both by lake and rail amounted to 17,257,814 bushels this September, against 25,266,810 bushels for the same month last year, a difference of approximately 8,000,000 bushels.

Well Known Great Lakes Ship Operator Dies

William J. ("Fingy") Conners Sr., 72, chairman of the *Courier-Express* and Great Lakes Transit Corp. boards, died suddenly from a heart attack at his home in Buffalo on Oct. 5.

His passing brings to light a colorful and strenuous career starting as a stevedore on the Buffalo docks at the age of 13 and ending as a powerful figure in industrial and political life. His successes embraced widely separated fields of endeavor and after accumulating a huge fortune in the Great Lakes transportation business, newspaper publication and real estate, he took his place as a philanthropist through the gift of $1,000,000 to charity in the city of Buffalo.

Mr. Conners was born in Buffalo on Jan. 3, 1857, attended public school and at the age of 13 was employed as a forecastle boy on a little freight steamer.

In 1916 he organized the Great Lakes Transit Corp., Buffalo, controlling about 85 per cent of the package freight and passenger on the Great Lakes and including extensive docks, terminals and warehouses along the Lakes. This Mr. Conners considered his greatest achievement in business.

When congress passed an act forbidding railroads to own, operate or control water transportation lines, Mr. Conners conceived the idea of forming a company to take over the great fleets operated by the roads. His plan carried through and the man who at the age of 13 had been a forecastle boy at $12 per month became the commodore of the greatest fleet of package freight and passenger ships in the history of inland waters.

From 1896 to 1908 Mr. Conners was an active politician. He was also one of the pioneers in the development of the Florida Everglades.

He entered the newspaper field in 1895 when he purchased the Buffalo *Enquirer*. In 1897 he acquired control of the *Courier* which he merged with the *Enquirer* and in 1928 he took over the *Express* and merged it with the *Courier*. This Buffalo paper is now known as the *Courier-Express*.

Iron Ore Shipments Drop

A decrease of 417,570 tons over the previous month was registered in tonnage in Lake Superior ores, according to the report of the Lake Superior Iron Ore association. Even though lower than the preceding month's figures, the September tonnage was greater than that for the same month last year. A total of 5,361,567 tons was moved during this month this year as against 4,607,963 for last year.

This decrease is attributed to the fact that six blast furnaces were idle during September. Increased activity in the steel mills is expected to result in a larger tonnage movement for the remainder of the season. The tonnage of ore on docks and at furnaces on Oct. 1 is in excess of that for the same time last year. This year there was a total of 38,125,312 tons as compared with 35,808,367 for Oct. 1, 1928.

Capt. G. A. Macaulay, master of the steamer AMASA STONE, died suddenly aboard his vessel Oct. 15 while the vessel was downbound with a cargo of ore from Lake Superior.

Capt. Macaulay had been in the service of the Interlake Steamship Co. since 1913. He had been master of the STONE for the last three years of his active service.

Plan Industrial Harbor

Construction of an industrial harbor in Lake Calumet, near Lake Michigan at East Chicago, Ind., by a private contracting firm which would finance the work and receive payment from the city on the installment plan has been recommended to a committee of the Chicago city council. The city would become the ultimate owner, under the plan. A lien would be placed on the land and improvements to cover the full cost of the work, according to the plans proposed.

Personal Sketches of Marine Men

Joseph W. Powell, Chairman Executive Committee, United Dry Docks Inc.

By Ben K. Price

—Photo by Bachrach

A DIRECTOR in many important enterprises, he has had a particularly thorough and varied experience in shipbuilding and marine affairs.

HE HAS held successive positions of responsibility in private shipyards. In 1921 he served as president of the Emergency Fleet Corp.

HIS latest achievement was the organization of a merger of six large dry dock companies in the New York metropolitan district.

TRAINED as a naval architect, with a fundamental schooling in marine affairs at Annapolis, an ex-naval constructor, war-time executive in charge of 70,000 shipyard men, one-time president and reorganizer of the Emergency Fleet Corp., principal organizer of United Dry Docks Inc., one of the largest dry dock companies in the United States, and at present an active factor in it and a score of other companies, technical organizations and clubs, Joseph W. Powell stands among the pre-eminent figures in the marine field today.

Still in the full stride of his achievements, Mr. Powell has the ability to absorb an amazing amount of detail and still maintain the perspective that one who commands requires. Fifty-two years of age, of vigorous physique, close to 6 feet in height, he has the crispness of manners of those who have much to do and do it.

Born at Oswego, N. Y., on Feb. 15, 1877, Mr. Powell was graduated from Annapolis naval academy in 1897 and he then saw duty in the Spanish-American war. Later he took a course in naval architecture at the Universty of Glasgow, Scotland, returning to this country in 1900 to become assistant naval constructor, first at the New York navy yard and later at the shipyard of the William Cramp & Sons Ship & Engine Building Co., Philadelphia.

In 1906 he resigned from the navy to become assistant to the president of the Cramp company. Eight years later he became president of the Fore River Shipbuilding Corp. owned by the Bethlehem Steel Corp. Ltd., at Quincy, Mass., and in 1917 became vice president of the Bethlehem Ship Building Corp. Ltd., in charge of construction at all the yards owned by the Bethlehem interests. It was in this latter capacity that Mr. Powell was in charge of more than 70,000 men. After leaving the Bethlehem company he undertook the reorganization of the Emergency Fleet Corp., of which he accepted the presidency in 1921 for a period of six months. Private enterprises then pressed for attention and over the next few years his time was divided in many directions.

One of his chief interests was the organization of United Dry Docks Inc., New York city, which goal he achieved early this year. This organization was a merger of six dry dock companies in the metropolitan district, comprising 27 dry docks with a combined lifting capacity of 160,000 tons and capable of handling approximately 7,000,000 tons annually. He is chairman of the executive committee of that company.

Mr. Powell only recently was made a director of the American Shipbuilding Co., Cleveland. Among other companies of which he is a director are the Merritt-Chapman & Scott Corp.; the American Trust Co., Boston; Chicago Junction & Union Stock Yard Co., Chicago; Atlantic Steel Castings Co., Chester, Pa.; and the Atlas Tack Co., Fairhaven, Mass. He is a trustee of Webb Academy, New York city and a member of the Corporation of the Massachusetts Institute of Technology, Cambridge, Mass. He is a vice president of the American Society of Naval Architects and is a member of the executive committee of the American Bureau of Shipping.

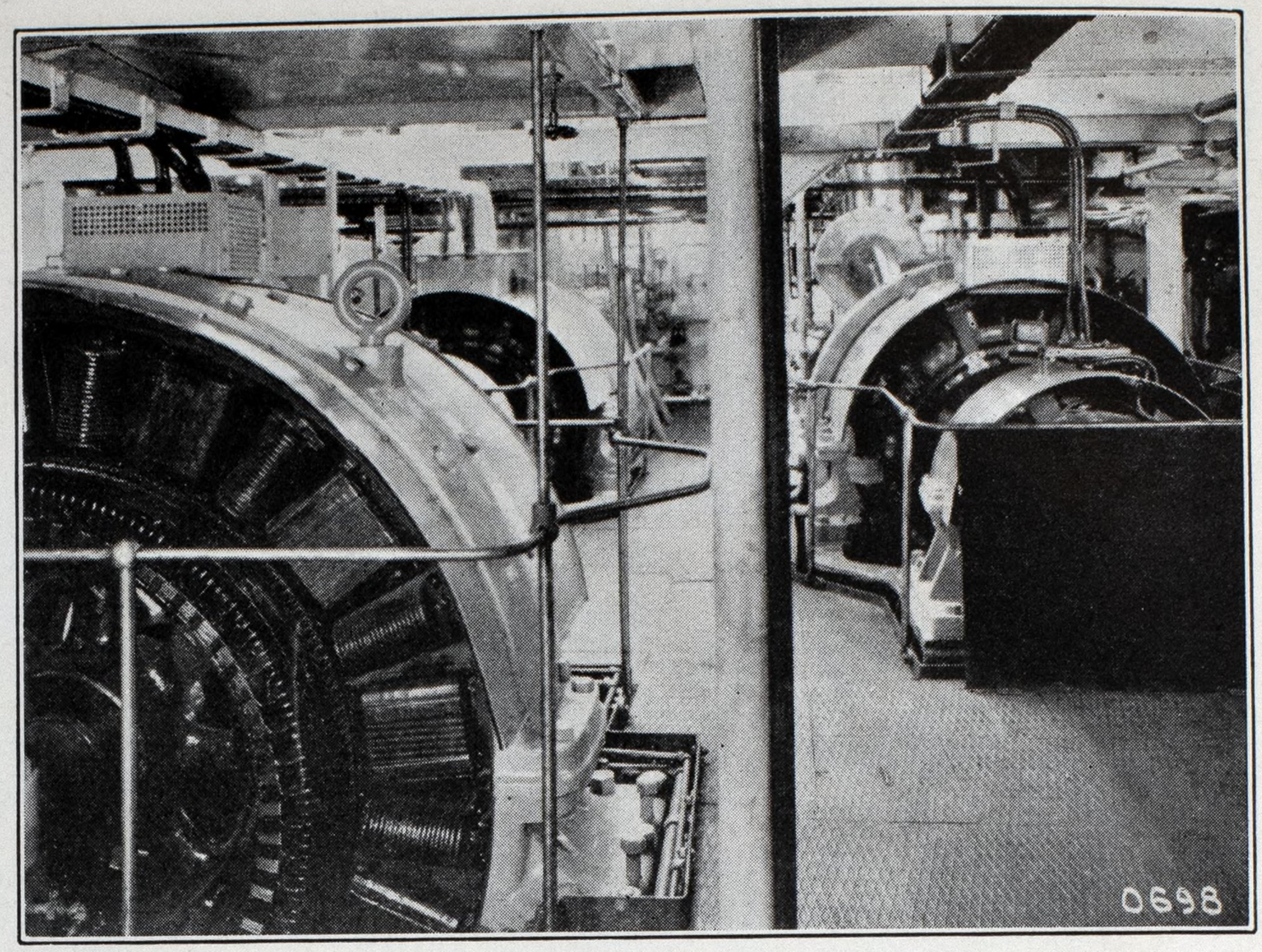
Mr. Powell's home is in Boston, although business forces him to spend much time each week in New York. His principal recreations are golf and shooting, as may be revealed by the following list of his club affiliations: Chevy Chase club, Boston; Country club, Brookline, Mass.; the Algonquin club, Boston; New York Yacht club, New York city; and Kittansett club, Marion, Mass.

Diesel Electric Drive

(*Continued from Page* 71)

Steel Products Co.'s motorship STEEL ELECTRICIAN, operating on the Great Lakes and through the Welland canal. This vessel is powered with a 750-horsepower Westinghouse propelling motor receiving power from three diesel New London Ship & Engine driven generator units. This vessel has been in service 3½ years and her operating record is considerably better than her direct drive sister ships, in the way of total cargo carried, continuity of service, faster passage through canal due to superior maneuvering ability, and cost of operation.

In considering new tonnage or conversion of existing ships, the progressive ship owner should give careful consideration to the diesel electric system when selecting his propulsion plant which must give long service.



ENGINE ROOM OF THE DIESEL ELECTRIC CARGO VESSEL STEEL ELECTRICIAN

Diesel Electric Ferries for New York

THE first of the two electric ferryboats built to run between New York city and the Manhattan State hospital on Ward's Island was launched on Sept. 25 and was christened the WARD'S ISLAND. The two boats were built at the New London Ship & Engine plant of the Electric Boat Co. and are of steel, double-end construction.

Completion of the two new boats brings the total number of electric ferryboats in New York harbor up to 12. There are in service at the present time six diesel electric craft, operated by Electric Ferries Inc., and four of the turbine-electric type, operated by the city.

The power plant on each of the new ferryboats consists of two six-cylinder, vertical, single acting, four-cycle, air-injection diesel engines built by the Winton Engine Co. Each engine is rated at 250 brake horsepower, and drives a direct current generator rated 160 kilowatts, 250 volts, at 325 revolutions per minute, shunt wound. Complete electric equipment has been furnished by the General Electric Co.

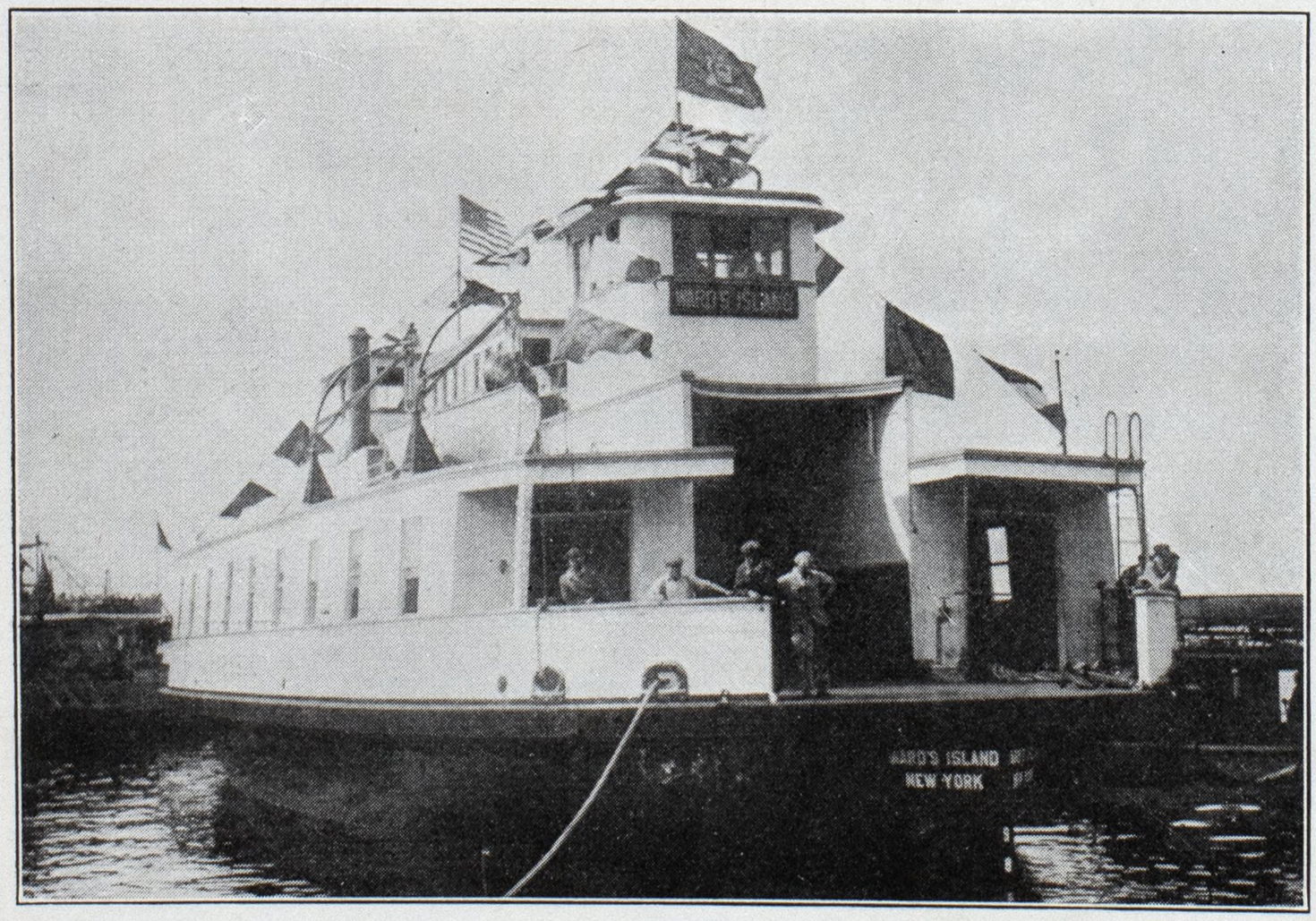
For the operation of auxiliaries, lights, etc., each boat has two direct-current generators, each rated 20 kilowatts, 125 volts, at 325 revolutions per minute, compound wound. The auxiliary generators are mounted on shaft extensions of the main generators.

Each boat is propelled by a direct current, double propulsion motor rated 400 horsepower at 180 revolutions per minute and 500 volts. This motor consists of two units each rated 200 horsepower, 180 revolutions per minute and 250 volts, shunt wound, and mounted on a single shaft thus keeping down the armature diameters.

Control of the electric equipment is of the variable voltage type, with control stations in the two pilot houses and the engine room, thus allowing the maneuvering operations of the boat to be governed from any one of the three points. The main generator and propulsion motor switchboard is of the dead-front type, while that for the auxiliary circuits is of the live-front type.

For propulsion the two main generators form a continuous series circuit with the motor armatures. By means of selector switches on the switchboard it is possible to connect the generators into the series propulsion circuit, or to complete the propulsion circuit without the use of any one generator. This is of considerable advantage in service.

The speed and direction of rotation of the propulsion motor is controlled by changing the intensity and direction of the generator excitation. Both boats were designed by Eads Johnson, New York.



WARD'S ISLAND—LAUNCHED SEPT. 25—ONE OF TWO DIESEL ELECTRIC FERRIES

M. S. Jeff Davis Trials

(*Continued from Page 77*)

TRIUMPH, all of which are now in service. This work was handled by the Federal Shipbuilding & Dry Dock Co. and the Boston and Norfolk navy yards. The JEFF DAVIS, a freight ship, was converted at the Maryland yard at a cost of $1,036,345, this including installation and special alterations, main engine, deck machinery, engine room auxiliaries and all incidentals.

The ship is 411 feet, 9 inches in length over all, and her length between perpendiculars is 395 feet, 6 inches. The JEFF DAVIS has a displacement at normal mean loaded draft of 13,141 tons, with a gross tonnage of 6204.21 tons and net tonnage 3851. The normal mean load draft is 27 feet, ¼-inch. Her fuel tank capacity is 1016 tons. Capt. P. P. Taylor was in command during the trial run, which was under the supervision of Capt. R. D. Gatewood, manager of maintenance and repairs for the shipping board.

The main engine, built by Worthington Pump & Machinery Corp., is of double acting, two-cycle four-cylinder air injection type and has working cylinders of 28 inches with stroke of 40 inches. The brake horsepower is 3625 at 115 revolutions per minute, giving a piston speed of 766.6 feet per minute. There are three fuel nozzles for each cylinder, one at the top of the cylinder and two at the bottom.

The American Brown Boveri Corp., installed a scavenger blower, with a capacity of 21,000 cubic feet maximum and equipped with 310 horsepower motor. Auxiliary generating and compressor engines are of the Nordberg Mfg. Co. make, single acting, two-cycle, air injection type, with diameter of cylinders, 17 inches and a 23-inch stroke. There are three cylinders giving 500 horsepower at 225 revolutions per minute. The piston speed is 862.5 feet per minute.

Emergency lighting and compressor set was supplied by the Cummins Engine Co., and the water pumps by the Nash Engineering Co. Oil pumps were furnished by the Kinney Mfg. Co. and the Viking Pump Co.

The boiler, installed by the Foster-Wheeler Corp., is of the waste heat type using exhaust from the main engine. Working pressure is 30 pounds gage and there is 1394 square feet of heating surface. It also is equipped with a Holly turbine type oil burner.

The propeller is of 4-blade, built-up type, with a diameter of 16 feet, 3 inches and a pitch of 12 feet, 3 inches. Steering gear includes a Sperry telemotor, with Westinghouse control and automatic follow-up. There are ten Hyde Windlass Co., winches, self oiling, of special design, driven by Diehl motors and with Westinghouse quick make and break type of controllers. Both winches and windlass are equipped with Cutler-Hammer Co. shoe brakes.

W. Dearborn Clark, assistant traffic manager of the American-Hawaiian Steamship Co., has been named chairman of the eastbound committee of the United States Intercoastal Conference at San Francisco. He succeeds Warren H. Clarke.

Examination For Naval Architects To Be Held

The United States civil service commission announces the following open competitive examinations: Associate naval architect, $3200 a year; assistant naval architect, $2600 a year.

Applications must be on file with the civil service commission at Washington, D. C., not later than Nov. 20, 1929. The examinations are to fill vacancies in the bureau of construction and repair, navy department, and in positions requiring similar qualifications. The entrance salary is $3200 a year for the associate grade, and $2600 a year for the assistant grade. Higher-salaried positions are filled through promotion.

Real Nature of the Work

The duties are to prepare contract and type plans for new designs and proposed alterations of vessels; to make studies, conduct theoretical investigations in connection with ship design, make calculations; to check and criticize plans, calculations, and estimates; to prepare technical correspondence. Associates are under nominal supervision; assistants are under general supervision. Competitors will not be required to report for examination at any place, but will be rated on their education, training, and experience.

Full information may be obtained from the United States civil service commission, Washington, D. C., or the Secretary of the United States civil service board of examiners at the post office or customhouse in any city.

Launch New Standard Transportation Tug

WHEN the tug SOCONY 23 *shown in the accompanying illustration, was launched recently at the Staten Island plant of United Dry Docks Inc., New York, it was the seven hundred and ninetieth hull sent into the water by that plant since its creation in* 1895. *The tug is one of two being built for the Standard Transportation Co., New York.*

Both vessels are intended for harbor and sound work, and are 97 *feet long,* 22 *feet wide and* 10 *feet* 9 *inches deep. Their keels were laid in June.*

Lubrication for Diesel

(*Continued from Page* 83)

sults in incomplete combustion and consequent formation of deposits. This may be caused by incorrect air-blast pressure, by low compression, or, in airless injection engines, by erosion of fuel nozzles, or, in either type, by partly choked fuel nozzles or burner plates. Erosion is minimized by purifying the fuel oil.

Another cause of improper atomization is the use of fuel that is too heavy at normal operating temperatures. When fuel is stored in a cold location, so that its viscosity is too low for efficient atomization, it is necessary to thin the oil by heating. Exhaust gases or hot jacket-water are frequently used for this purpose.

Incomplete combustion can occur also when the engine load is not equally distributed among the power cylinders. This condition is revealed by exhaust temperatures from each cylinder, and by indicator cards.

Since it is most important from the standpoint of economical operation that correct timing be maintained, and since incorrect timing is one of the causes of deposits, this phase of operation must be checked regularly.

Fuels often contain incombustible impurities. If these are not removed before use, they mix with the oil film upon the cylinder walls, gradually working their way into the ring grooves where they bake into hard deposits and destroy the effectiveness of the rings as packing. In the majority of up-to-date installations this condition is so well appreciated that suitable filters or centrifuges are used to clarify all fuel oil.

Excessive sulphur in fuel may often blacken the cylinder walls and pit the exhaust valves and pipes. This trouble occurs when burned gases become cool enough to permit condensation of their water vapor. Sulphur gases, dissolving in this water, form the corroding acids. This may happen in an idle cylinder which has retained it burned gas after the engine has been shut down. It may also occur on exhaust valves, and in exhaust ports and pipes. To avoid these conditions some installations are equipped so that the engines can be maneuvered with a special fuel oil.

Impurities in intake air are not as troublesome in marine as in stationary diesels, but they may be responsible for certain deposits. The best position for an intake should be carefully considered; its location should assure least possible contamination. But even under best conditions, intake air will contain appreciable quantities of dirt, and the use of suitable air filters will always be found desirable.

Leaky exhaust and inlet valves allow loss of compression and greatly reduce fuel economy. They also tend to promote the formation of deposits.

Only a high-grade, properly refined oil should be used for piston cooling. Ordinary oils leave deposits which accumulate rapidly on the underside of piston heads. These may so retard cooling that the consequent heat stresses will crack the pistons.

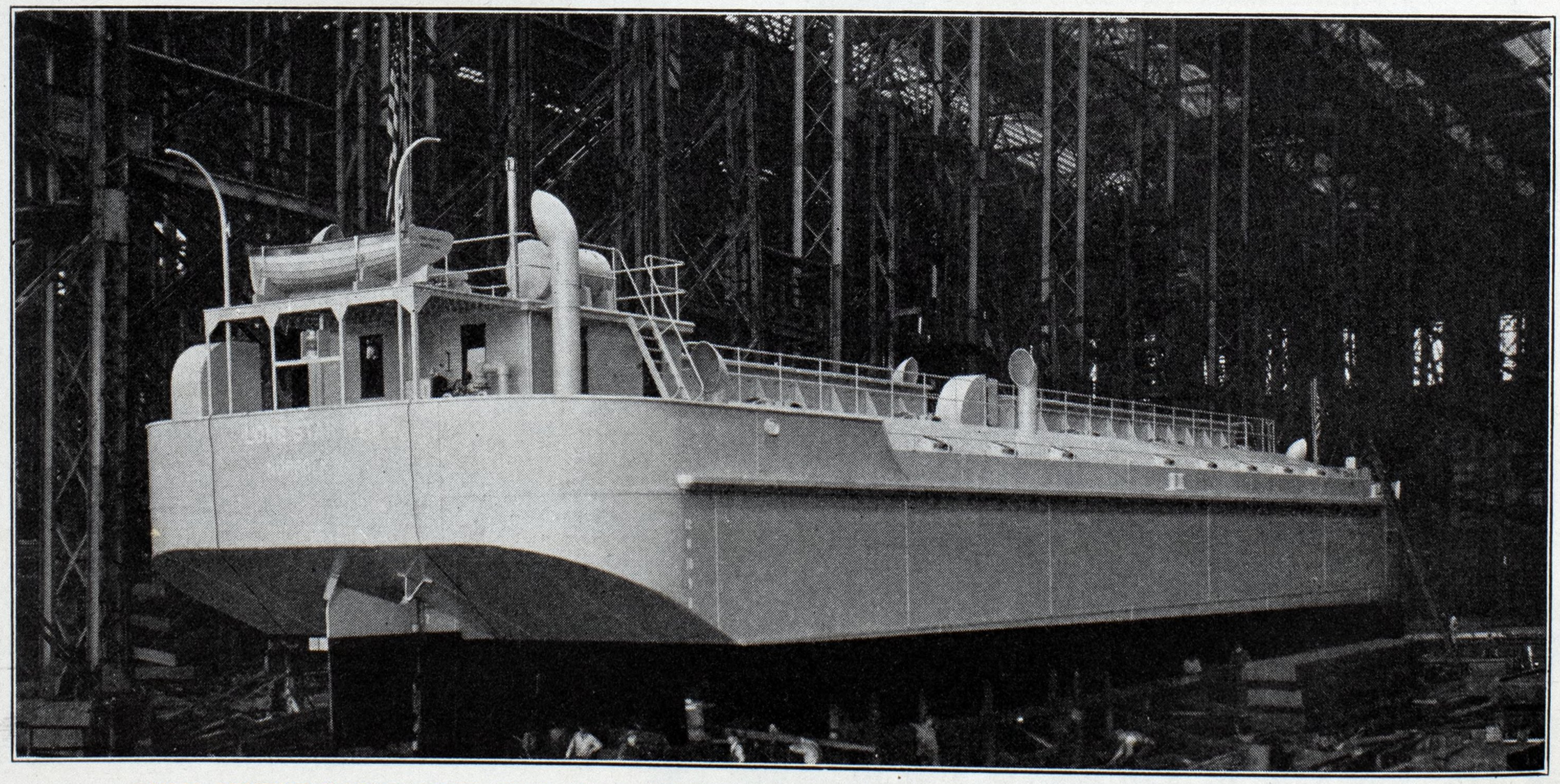
(*To be Concluded in December*)

Completes Unique Bulk Cement Barge

THE New York Shipbuilding Co., Camden, N. J., recently completed the bulk cement barge LONE STAR No. 1 for the Lone Star Cement Corp. of Virginia. The vessel is designed to carry cement in bulk between Norfolk, Va., and Washington, D. C., and is the third vessel of this type built by the New York Shipbuilding Co. The vessel is constructed entirely of steel to the following dimensions: Length, 163 feet 6 inches; beam, molded, 37 feet 4 inches; and depth, molded, 13 feet.

The cement bins, 20 in number, are arranged with sloping bottoms leading to a longitudinal screw conveyor on each side of the vessel. Each bin discharges to the conveyor through three gates fitted with screw controlled slides. The bins extend above the weather deck and are made perfectly watertight. They are filled through a series of hatches on top of a fore and aft trunk. These hatches are closed with steel covers and fitted with a tarpaulin and battening arrangements for watertightness. The total capacity of the bins is 23,500 cubic feet.

The cement cargo is discharged by two Fuller Kinyon pumps fitted amidships. The cement is fed to these pumps by 16-inch screw conveyors. Both the pumps and the conveyors are driven by electric motors



BULK CEMENT BARGE LONE STAR NO. 1 ON THE WAYS OF NEW YORK SHIPBUILDING CO., CAMDEN, N. J.

United States Lines Plan Six Ships

On Oct. 10 the United States Lines Inc. invited American shipyards to submit bids on the construction of two 30,000-ton passenger and cargo liners, the largest ever to be built in this country. Bids on these vessels are to be submitted by November 15, as soon as possible after which time construction will be started. The new liners are to be operated, it is believed, in the summer tourist trade of 1931, on a weekly express service with the LEVIATHAN.

The new vessels are to be slightly less than 30,000 gross registered tons and will be rated at 22 knots. The length of the ships will be 705 feet, beam 82 feet and draft 30 feet.

Specifications include turbine propelling machinery with twin screw propulsion. Those shipbuilding companies which have facilities for building vessels of the type will be asked to submit bids for electric drive propulsion. These two super liners are to cost between $25,000,000 and $30,000,000 each.

In addition to the construction of these two 705-footers, the company is considering adding four other ships to its fleet prior to the year 1933. The construction of these six vessels will in the future enable the United States lines to maintain weekly sailings with the large express liners and also weekly sailings with the fast cabin vessels yet to be built. Success of the company's shipbuilding program is said by officials to depend largely on the financial assistance provided for in the Jones White bill, such as a construction loan from the shipping board and a mail contract from the Post Office department. If this construction program is completed, it has been estimated on the basis of present shipbuilding prices in the United States that the six vessels will represent an investment of $100,000,000.

Contract for repairing the steamer PLYMOUTH which was severely damaged recently in a fire along the waterfront at Portland has been awarded to the Robins Dry Dock & Repair Co. at Brooklyn.

Mississippi Barge Line

The recently organized Mississippi Barge Line Co. which was capitalized at $3,000,000 is to begin within four months bi-weekly barge service between Cincinnati and New Orleans. It is said that 50 barges and five towboats of 1600 horsepower each are going to be built by the company. Several towboats and barges are now in construction in Ohio valley shipyards for the company.

A fleet of light steel barges to be equipped with diesel engines for carrying grain from Kingston to Montreal is being built by Canada Steamships Ltd. The first barge is to be launched in the near future by the Davie Shipbuilding Co. The length of the vessel is 252 feet.

Oil Transfer Tug Boat

The Oil Transfer Corp., New York City, has placed a contract with Ingersoll-Rand Co. for an 800-horsepower direct reversible marine oil engine for installation in their new tugboat which is being built by the Spedden Shipbuilding Co.

It will be remembered that the Oil Transfer Corp. already have a direct reversible Ingersoll-Rand oil engine in their motor tug HUSTLER.

The Royal Mail Steam Packet Co. according to general manager, P. G. M. Mitchell is planning the construction of a new liner to be operated in the trade between Great Britain and the east and west coasts of the Continent. The new vessel is to have diesel electric drive. It is expected that the order will be placed with Harland & Wolff, Belfast.

Thousand-Foot Liner

The French line according to Rene Fuld, vice president of the line and also vice chairman of the Penhoet Shipyards has practically completed its plans for building a four-day 1000-foot liner. The Penhoet Shipyards at St. Nazaire where all of the French line ships are built are constructing a berth for the building of ships as long as 12,000 feet. Dry docks for vessels more than 1000 feet are also being built by the company. In excess of $3,000,000 is being spent on this new construction.

Hain Steamship Co. of England has invited tenders for building cargo vessels of about 8000 tons capacity, fitted with boilers fired with pulverized coal. Main engines are to be single-screw quadruple expansion type with exhaust turbine. The ships will have a service speed of 15 knots. The pulverizing machinery to be used is the Howden-Buell system. Double bottoms are to be provided to carry oil in order to permit of its use, apparently, on routes where coal may be scarce to obtain.

Red Star Line Plans to Convert Two Ships

The Red Star line subsidiary of the International Mercantile Marine Co. is planning to convert two of its cabin liners, the PENLAND and the REGINA from cabin vessels to exclusive tourist third cabin carriers. This will result in reducing the rates on these vessels by approximately $20 as the minimum cabin charge is around $155 while that of tourist third is about $125. In case this proposal of the Red Star line is carried out, it is almost certain to lead to conversions by other lines which include the Canadian Pacific and Cunard line. The proposed low rates on the Red Star liners would result in offsetting the rail differential from the western part of the United States to seaboard and would offer lower steamer fares than those of other lines.

The North Atlantic Passenger conference which is made up of North Atlantic passenger lines is objecting through some of its members to the proposed plan of the Red Star line on account of the fact that its effect on competition would cause an upheaval of the lines of the North Atlantic.

New Tide Water Tankers

A contract for the construction of two tankers for the Tide Water Oil Co., each of 13,400 tons deadweight was awarded to the Sun Shipbuilding & Dry Dock Co. late in September. Another tanker is being built and equipped at the yard of Pusey & Jones Corp. for the Tide Water Oil Co. The General Electric Co. has received the order for the electrical equipment on the new vessel.

White Star Motor Liner

The White Star line through A. B. Cauty, director and general manager recently announced plans for the construction of another motor liner of approximately 27,000 gross tons registered. The new vessel, which is to be a sister ship of the BRITANNIC, is to be ready for service next March and is to be electrically driven. No decision has been reached as to the type of generating power which will be used.

A large ice breaker for keeping the St. Lawrence river and gulf open to navigation during the winter is being built by Canadian Vickers for operation by the dominion government.

Pulpwood Shipments

(*Continued from Page* 89)

about 30 degrees, thereby speedily and safely tipping the wood out into the storage pond at the back of the towers.

The deck loads are rapidly unloaded, and when taking wood from the hold of the boat each unloading tower serves three hatches with two skips per hatch. The rate of discharge of course depends upon the man power in the boat, but with two towers operating steamers of 1400-cord capacity are unloaded in from 14 to 19 hours, depending upon the number of men filling the skips.

All operations of the tower are controlled by one man located in a convenient position where he has an uninterrupted view of the skips. The advantages of this system are:

1. Maximum safety for the men filling the skips with pulpwood.
2. Minimum fatigue for the men.
3. Greater unloading capacity per man.
4. Lower cost for unloading because of discharging the boat within 24 hours dispatch allowed for this operation.

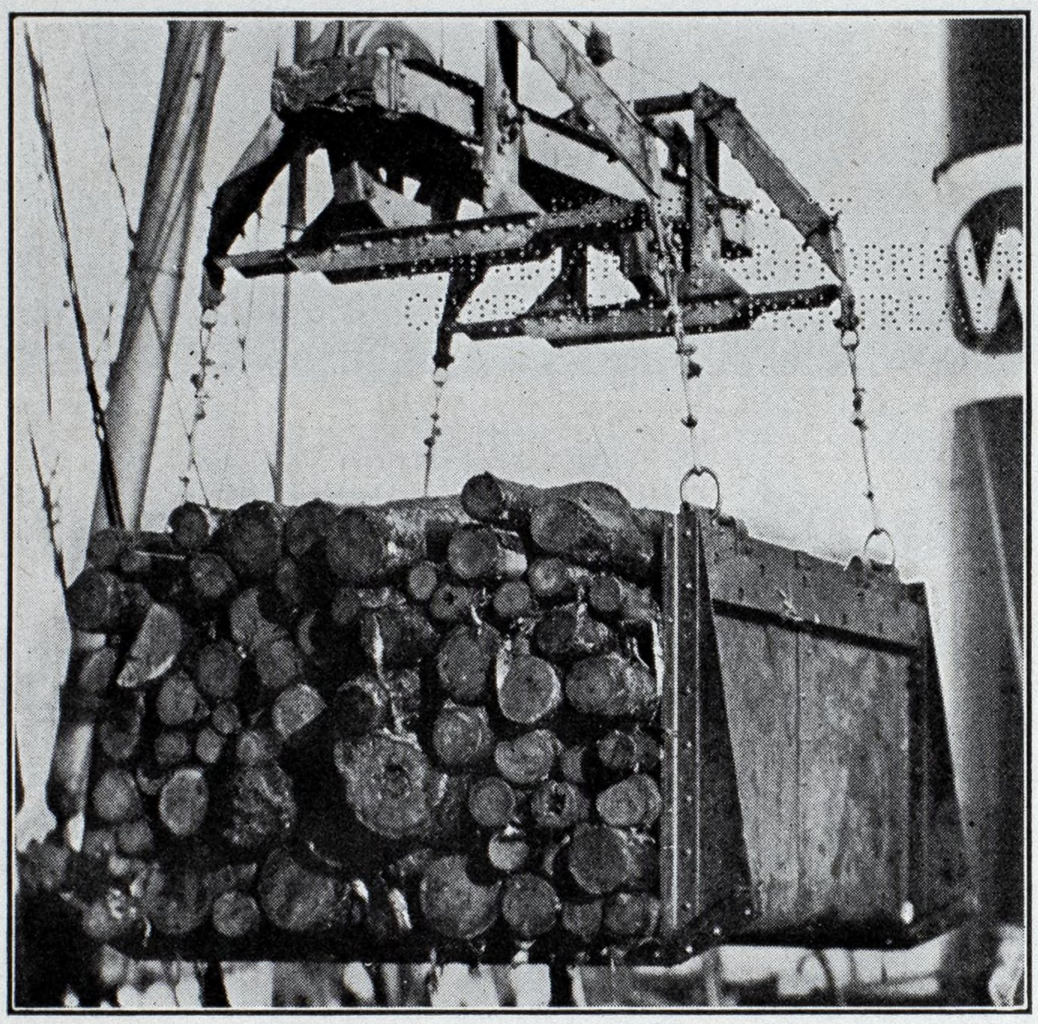


FIG. 5—AUTOMATIC DUMPING SKIP FOR UNLOADING PULPWOOD. IT HAS A CAPACITY OF 1½ CORDS

Increasing Rate of Operation

It is the author's observation that barked pulpwood is more easily handled than pulpwood with the bark on, and whenever possible it would seem desirable to bark the pulpwood before loading on the steamers. In a cargo of 1400 cords of unbarked wood there will be some 480 tons of bark, which in itself is an unprofitable cargo. Further, in every operation of handling unbarked pulpwood, some of the bark falls off and must eventually be gotten out of the way.

In the case of the systems described above it was observed that the handling of unbarked wood caused difficulties and expense in connection with the following operations:

1. On the multiple chain distributing conveyor, bark falling off the logs not infrequently clogs the movable plough and other mechanism, making it necessary constantly to remove the bark from the conveyor distributing mechanism.

2. The pulpwood fed into the concentrating basin loses a portion of its bark, and as this sinks to the bottom and builds up, the time comes when the basin must be dredged so as to preserve the required depth of water.

3. When the vessels arrive at their destination for unloading, the bark becomes a serious item of expense as it will be found that from 35 to 40 tons of loose bark will be left on the steamer when the 1400 cords are unloaded. This bark materially slows down the unloading operation, and the 35 to 40 tons of bark are handled a number of times in discharging the cargo. This is especially noticeable when unloading the holds of the vessels as the loose bark builds up to such a depth that it must be forked to one side to permit the men in the boat to pick up the logs when loading the skips. Consequently this accumulation of bark is handled many times before the bottom layer of wood in the boat is reached.

4. After all the wood has been unloaded from the boat it becomes necessary to remove the 35 to 40 tons of saturated bark and this alone is responsible for at least one to two hour's delay.

It is my contention that pulpwood, when being handled in such quantities should be barked before it is put aboard the steamer, for the reason that in a boatload of 1400 cords of unbarked wood there are some 480 tons of bark. If the bark were removed, about 225 more cords of wood could be stowed. Freight must be paid on bark, which is waste, at the same rate as on pulpwood. The bark must eventually be removed, so why not get it off beforehand? From Anticosti Island to Three Rivers the Freight rate is some $3 per cord, so over $600 is paid for freight on bark which must eventually be removed, and a study of the situation clearly indicates that it would be cheaper to bark the wood before it is loaded into the boat. Wood with its bark off is much easier to stow and handle, and of course weighs much less. In addition, the bark which falls off in transit clogs up the machinery, and when stowing and unloading it is difficult and expensive to dispose of this loose bark. I feel that in the manufacture of newsprint up to the present time, the engineering study had been mostly devoted to the machinery used after the pulpwood has been reclaimed from the mill storage yard, but not much thought has been put on the handling of the wood itself.

This system for unloading is a more economical method than has yet been devised. The cost per cord is less than 25 cents. The laborers are paid 25 cents per cord for loading the skips; i.e., they are paid by piecework, and yet it costs the company unloading the boat only 17 cents. In other words, the company contracts with the stevedore to unload its boats for 25 cents per cord, but as the company earns a steamer dispatch premium of about 8 cents per cord, the net unloading cost is 17 cents.

American Scantic Line to Train Youths for Sea

An opportunity will be afforded young men of good character and some high school training to take up the sea as their vocation by becoming cadets for the American Scantic line, according to an announcement made on Oct. 6 by B. G. Furey of the operating department of Moore & MacCormack, 5 Broadway, New York.

The American Scantic line operates nine passenger and freight vessels between New York and Baltic ports and under present plans two young men are being selected to serve as cadets aboard each ship. These young men will serve for three years, after which they will be eligible for licenses as mates or assistant engineers with positions as junior officers.

Regular vocational training will be given and after the first year the cadet will be free to follow his inclination toward either the deck or engine departments. Besides technical training each cadet will be supplied with a set of modern textbooks so that he may be enabled to strengthen his educational training.

Safety on Marine Piers

(*Continued from Page* 90)

instructed to nail on dunnage until the covers are safe to work over.

The greatest single cause of accidents from the numercial standpoint results from the hand handling of cargo. Now we have come to the principal part, which is supervision.

Supervision on terminals, like any well managed business, must function through a well organized force. Supervision has been the principal reason for the success which has attended efforts at Seattle since July, 1924. Proper supervision of dock equipment and the flow of cargo will eliminate 90 per cent of terminal injuries.

The dock superintendent should so arrange his men that there is one capable leader in charge of the dock work at each hatch who knows just where the cargo is to be placed on the dock, and how it should be piled for safety, one who can maintain an orderly movement of his gang at all times. Confusion is a common cause of injury and of damaged cargo. Each detail of the work that requires intelligent thought should be delegated to a workman who is able to assume full responsibility.

When a ship is loading or discharging from or to a dock there are usually two dock workers to each hatch who are subjected to more than ordinary dock hazards. These are the sling-up men. They must take care of themselves from swing loads, from landing loads, from being caught by sling, from objects falling from sling and from dock equipment. The sling-up men usually have plenty of room to step back fore and aft in order to avoid the drift of the slingload. However, in the case of working lumber or other cargo to or from cars, he is always in an extremely hazardous position. In this class of work the greatest number of injuries occur and those of the greatest severity. While the sling-up men seldom come under the dock supervision, the dock management can do much to improve their working conditions.

In conclusion the results that have been attained are: Better foreman control resulting in less personal injuries. Less broken and otherwise damaged cargo. Better tonnage at less cost. More intelligent action. Improved co-operation.

Receiving Freight at the Bulkhead

RECEIVING less carload freight at the head of the dock instead of allowing trucks to come down the dock and unload, has proved an excellent means of reducing dock congestion, with consequent lowering of stevedoring costs and with better service to the shipping public. This method of receiving freight is known as bulkhead receiving.

One line found that 25 per cent of its truck freight was delivered by 75 per cent of the trucks. Approximately 75 per cent of the trucks were kept off the dock by receiving freight at the bulkhead. Formerly trucks would get in the way of other trucks and in the way of stevedores, delaying deliveries, irritating shippers and running up the cost of loading cargo.

Another line, operating side port ships, is now studying the possibilities of bulkhead receiving to relieve congestion on the dock, which is the worst the author has seen.

Over 1000 tons of general cargo are handled daily on this terminal. Trucks enter at one end of the shed and leave at the other end. The shed is only 55 feet wide in one section and 75 feet wide in the other section so that with trucks entering, unloading and leaving, and with numerous stevedores handling cargo with two-wheel hand trucks, a congestion results that is destructive to efficient operation. This condition reflects itself in the high cost per ton for the cargo handled. The congestion can be eliminated to a large extent by the construction of a receiving platform at the ends of the dock so that all trucks with small loads could be unloaded outside the shed.

When bulkhead receiving is inaugurated on a terminal, mechanical equipment is usually used in place of hand trucks. This is because of the longer haul to the ship or to place of rest on the dock. Load carrying trucks, lift trucks, tractors and trailers are used.

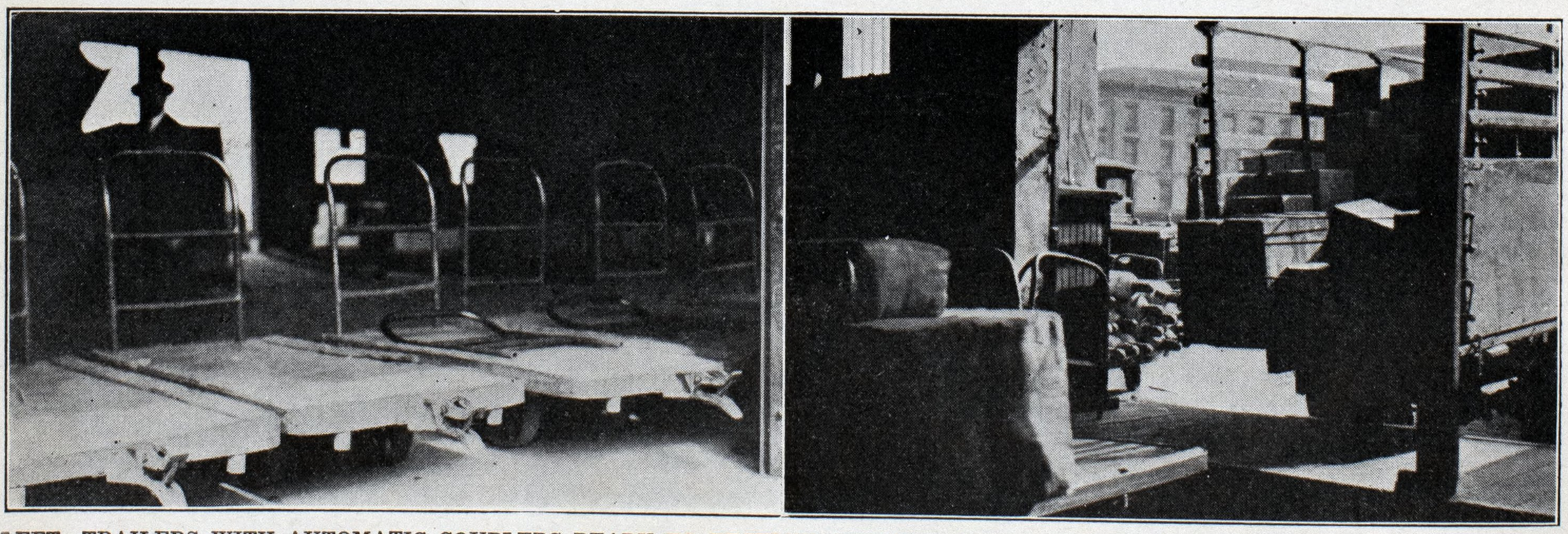
A coastwise line, using skids and lift trucks, has a receiving section at the bulkhead which accommodates only four trucks at one time. This section, however, cares for 200 trucks daily.

A Hudson river line uses tractors and trailers. These are made up into trains in a space back of the receiving bulkhead. Loads are kept on trailers until loaded into the steamer. Some commodites that are expensive to handle are allowed to remain on the trailers until delivery at destination. Shippers' truckmen often rustle their own trailers to unload quickly.

On some docks the street surface and the floor of the receiving shed are at the same level. Others have a narrow platform, such as shown in one of the illustrations. This type is unsatisfactory because extra handling is necessary to transfer freight from trucks to trailers.

Some terminals have a raised floor. Trucks back up to the bulkhead and unload to trailers or skids.

Bulkhead receiving can often be adopted as a means of reducing dock congestion, or avoiding the necessity of acquiring additional dock space.



LEFT—TRAILERS WITH AUTOMATIC COUPLERS READY TO RECEIVE FREIGHT FROM STREET TRUCKS. RIGHT—BULKHEAD RECEIVING AT THE EASTERN STEAMSHIP CO.'S NORTH RIVER TERMINAL, NEW YORK

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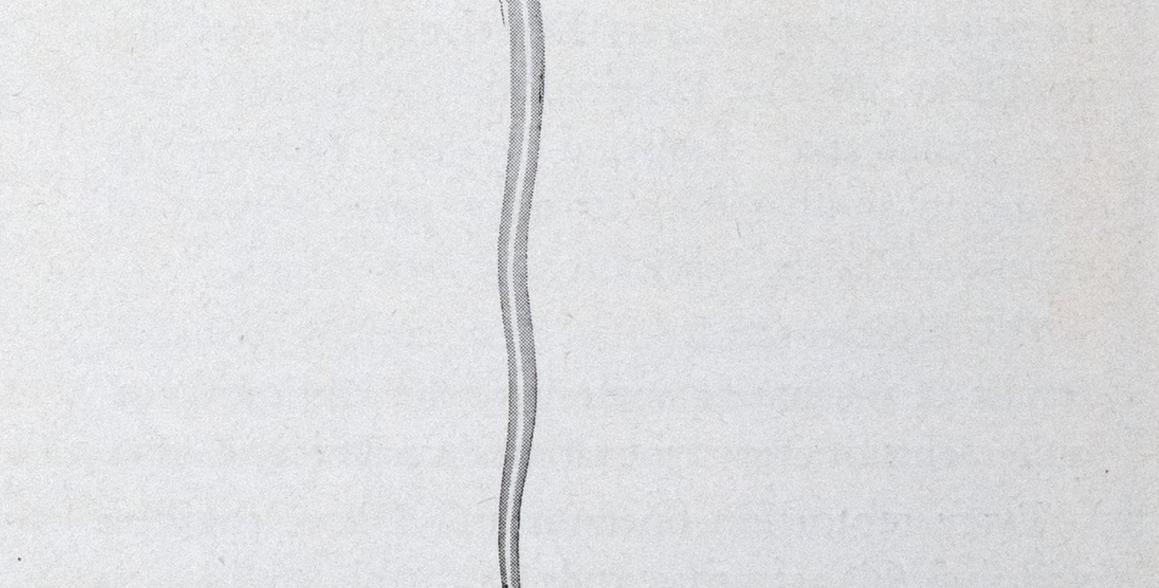

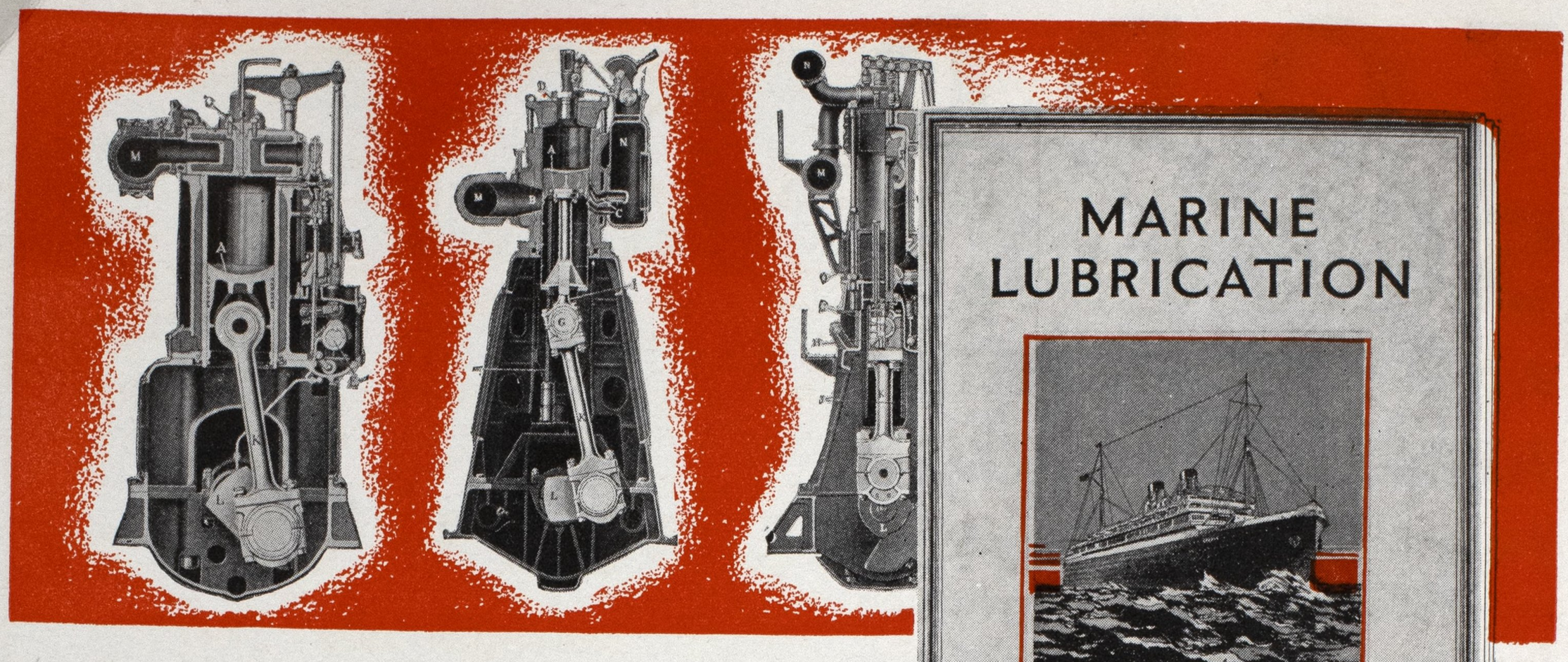

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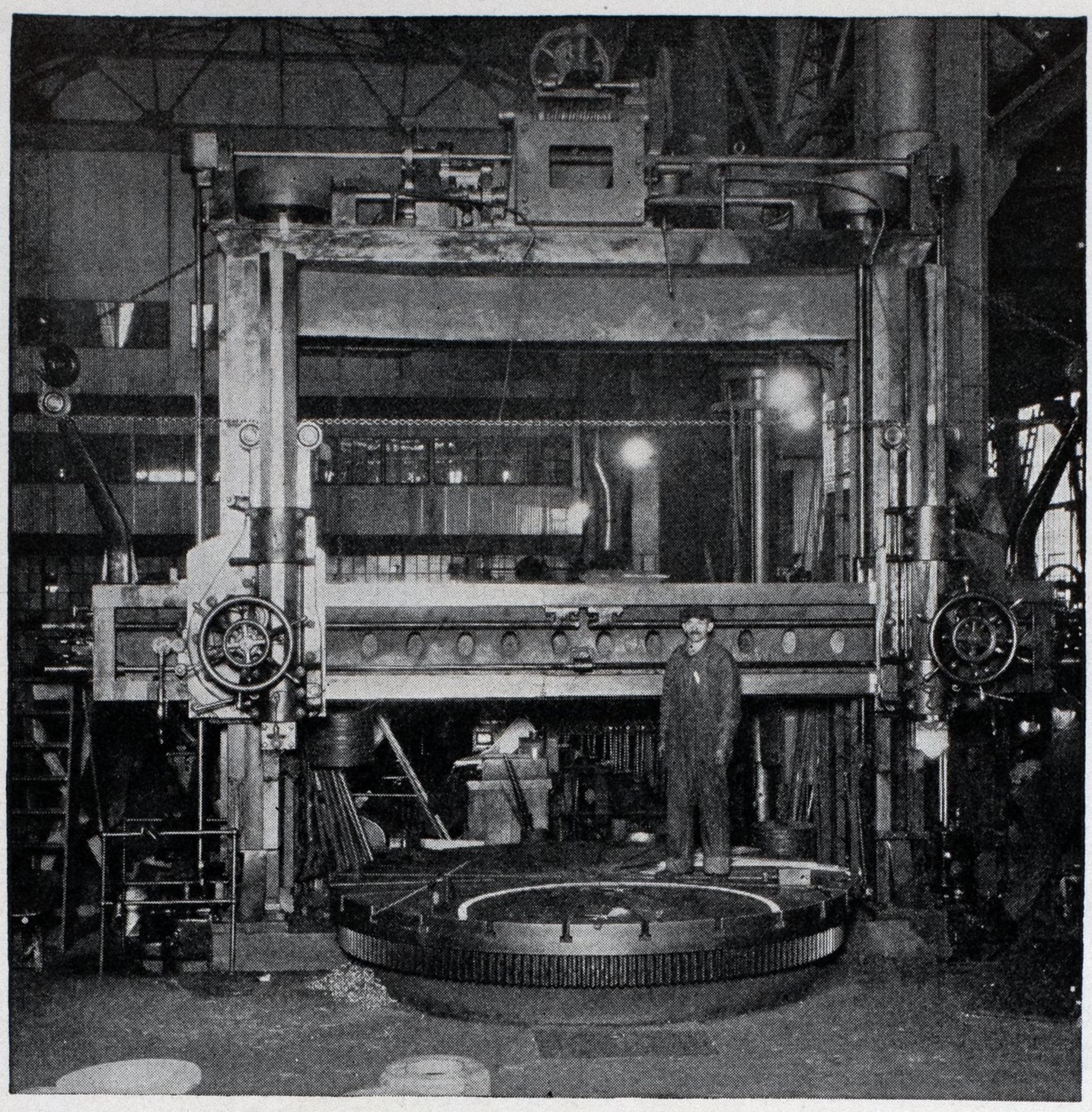

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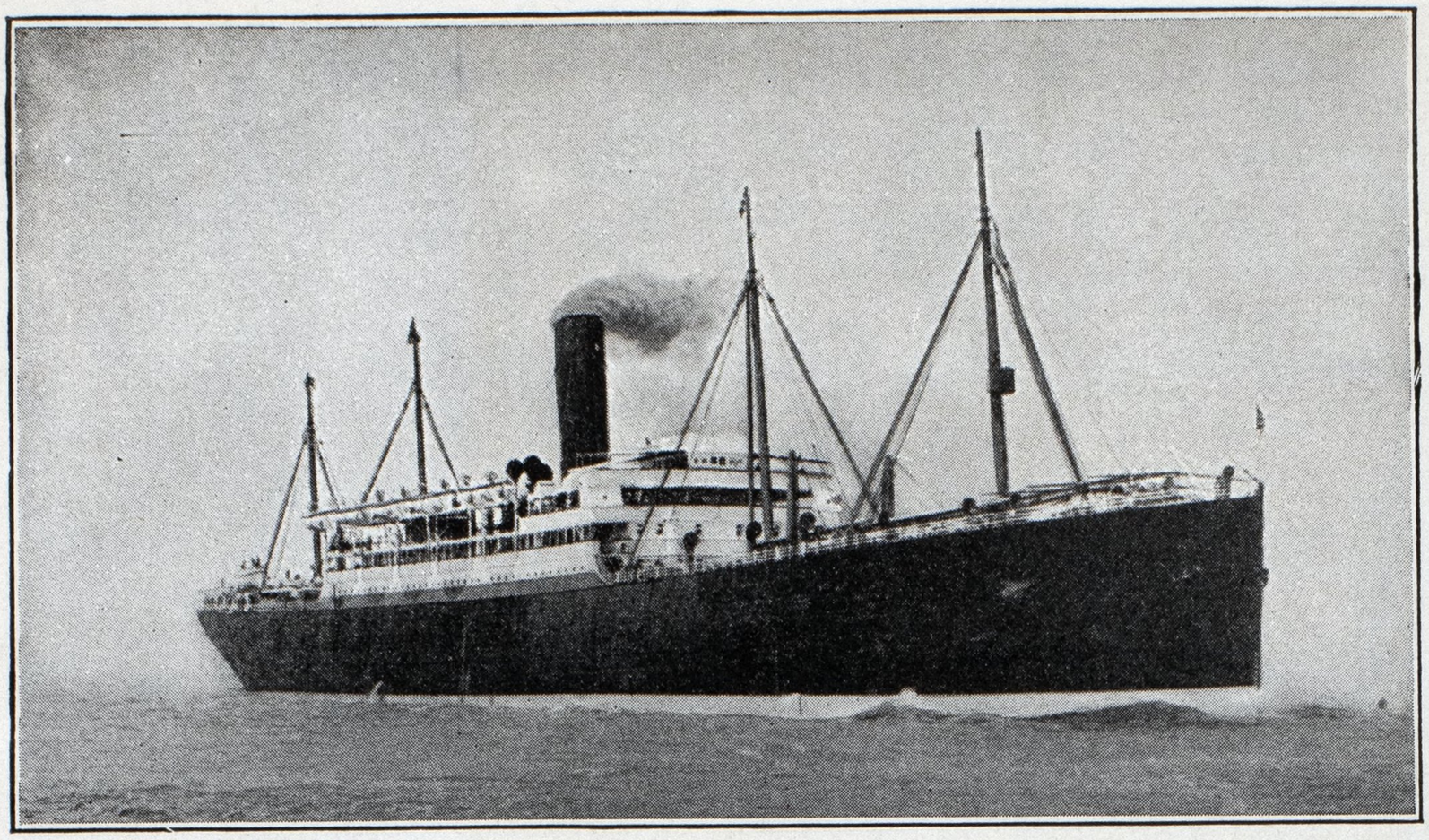

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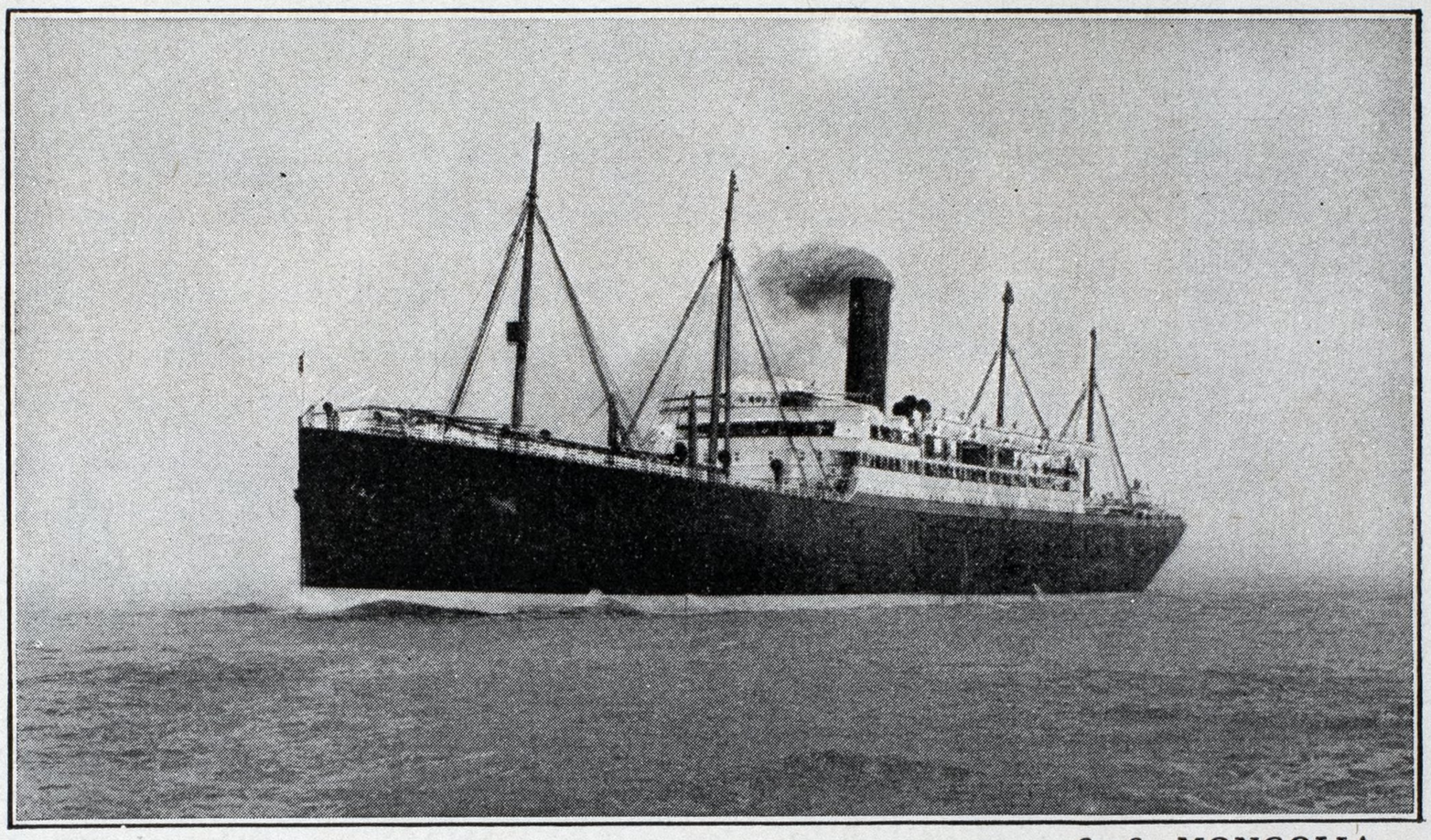

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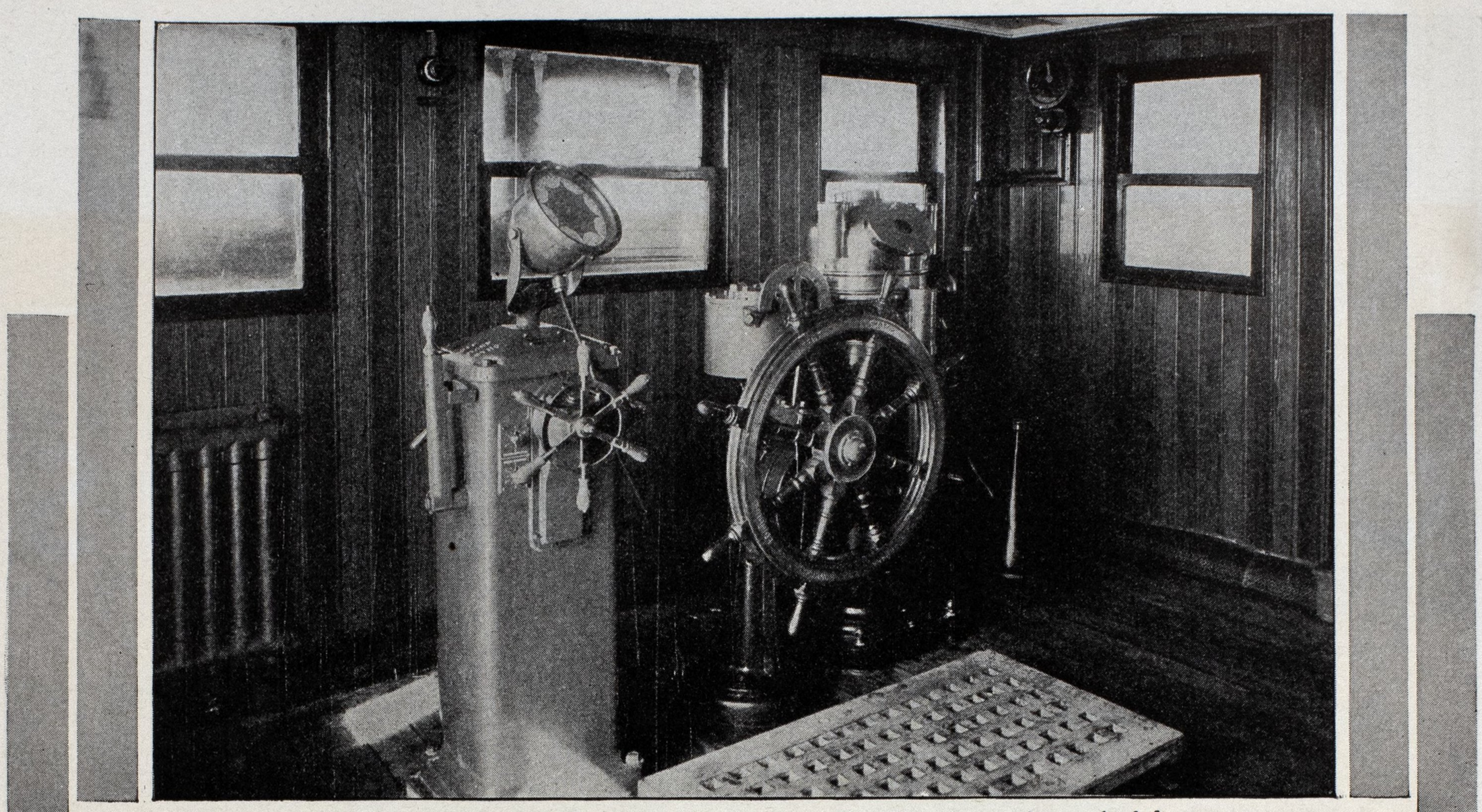

Wheelhouse of the S.S. Plume showing the Sperry Two-Unit Gyro-Pilot at the left

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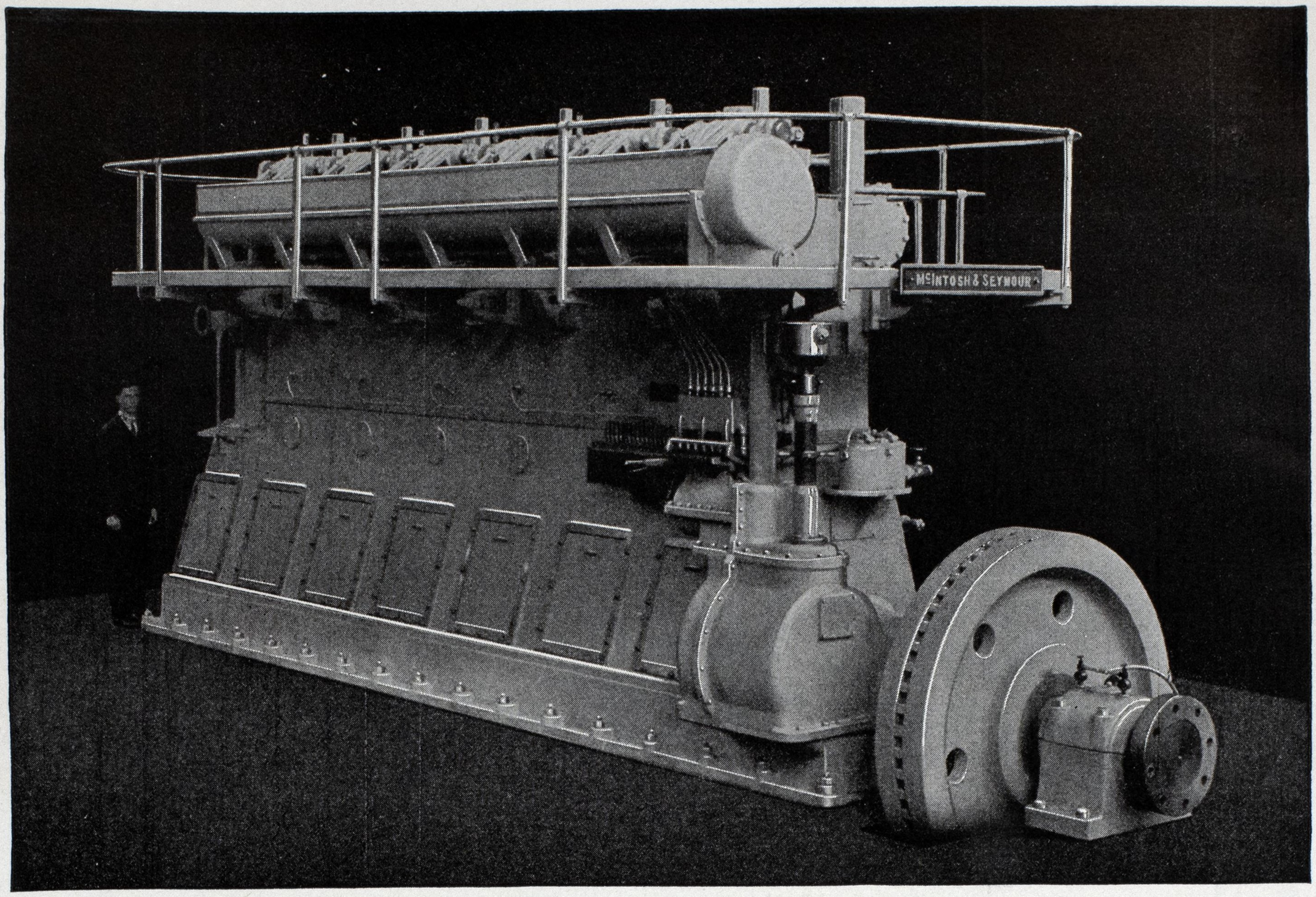

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The speed of these units makes the engine itself small and low in cost for its power output, and further money saving is effected through the reduction in generator size, and smaller headroom and floor area are practical for the combined unit.

Every design refinement for high fuel economy, through lubrication, minimized wear at sliding surfaces, and for low operating and maintenance costs has been embodied in these high-speed units and they are in every respect able to uphold the well-known McIntosh & Seymour reputation.

The clean cut body lines and readily accessible outer surface enable the attendant to preserve a spic-and-span appearance with little wiping effort.

If you are figuring on Diesel-electric power for propulsion, dredging, auxiliary service, etc., let us suggest desirable combinations based upon these units.

Ask for a copy of our bulletin, McIntosh & Seymour Diesel Engines for Motorships.

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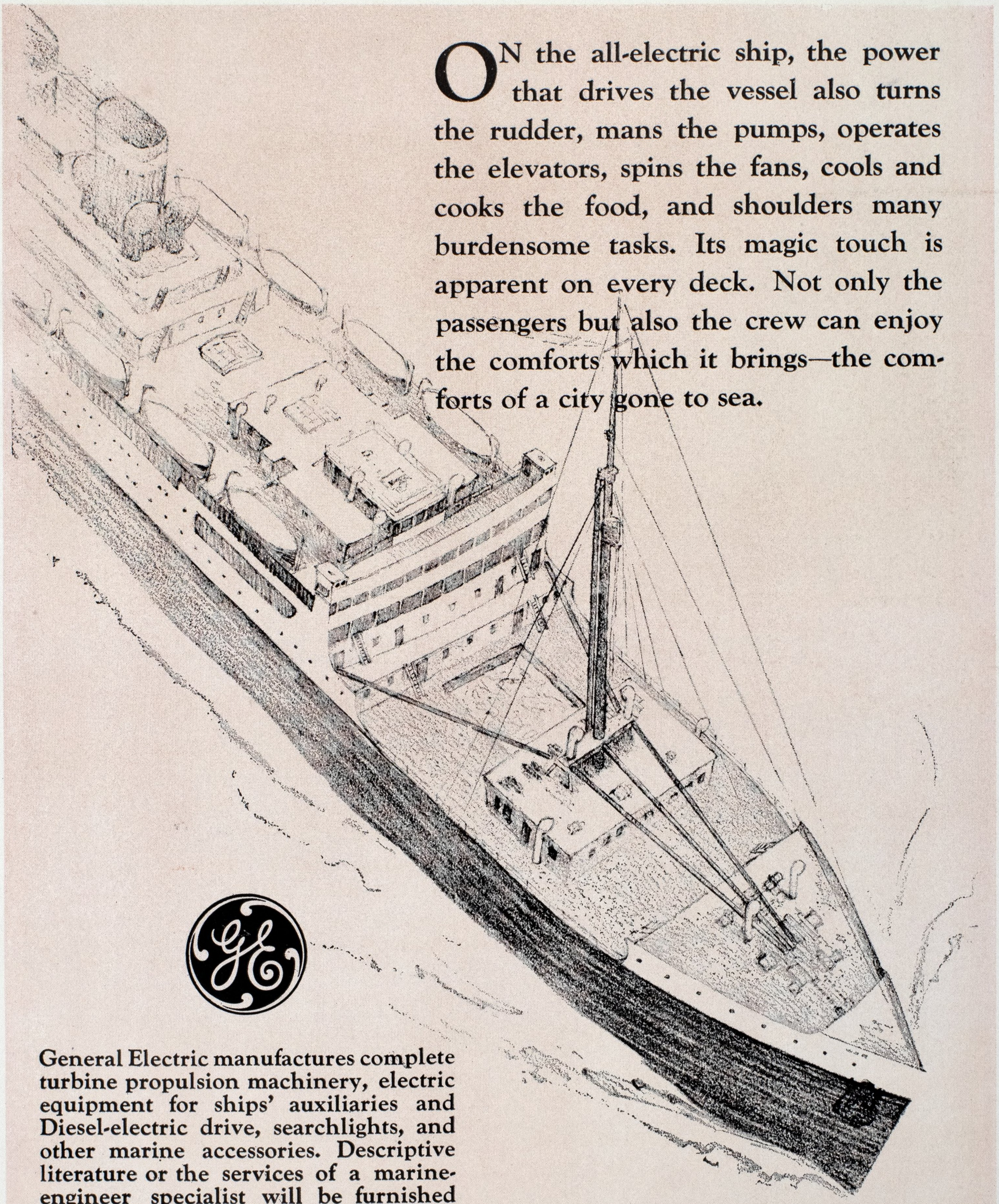
McINTOSH & SEYMOUR DIESEL ENGINES



ON the all-electric ship, the power that drives the vessel also turns the rudder, mans the pumps, operates the elevators, spins the fans, cools and cooks the food, and shoulders many burdensome tasks. Its magic touch is apparent on every deck. Not only the passengers but also the crew can enjoy the comforts which it brings—the comforts of a city gone to sea.

General Electric manufactures complete turbine propulsion machinery, electric equipment for ships' auxiliaries and Diesel-electric drive, searchlights, and other marine accessories. Descriptive literature or the services of a marine-engineer specialist will be furnished promptly if requested of the nearest G-E office.

231-23

JOIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

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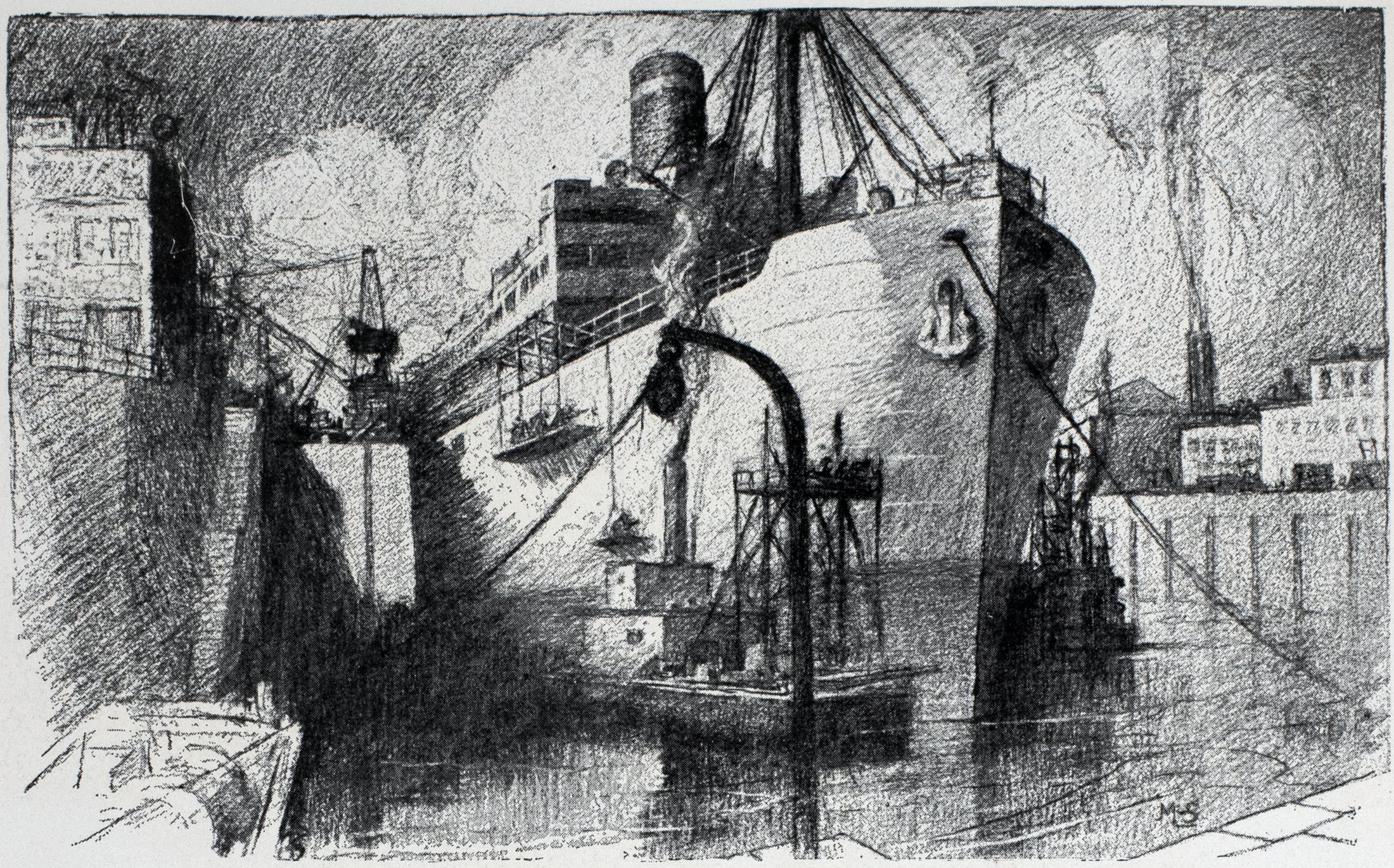

Tied up for overhaul —

that's when to call a G-E Service Shop

When your ship is in need of periodic overhaul, voyage repairs, or emergency repairs to electric equipment, a phone call from the dock or a radio message before you reach port will find a General Electric Service Shop ready, day or night.

Trained personnel and facilities for all sorts of repairs to electric equipment either in the shop or on the ship are always available. These make the seaboard General Electric Service Shops of immeasurable value to shipping.

You are never out of reach of G-E service. Express will reach the nearest Service Shop in a day. If the job is too large to ship, experienced men will come to you. Our shops are located in the following cities:

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Cleveland	Los Angeles	Philadelphia	Schenectady
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91-34

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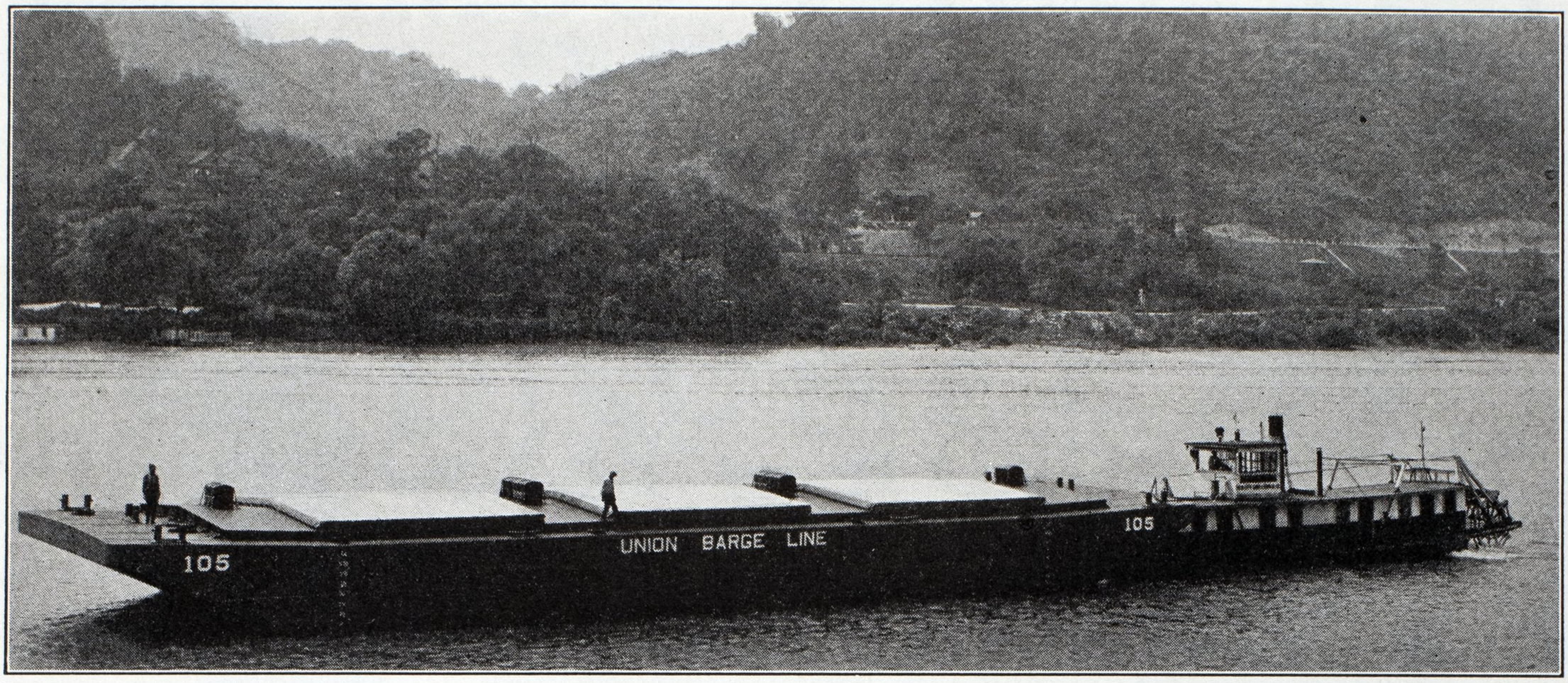
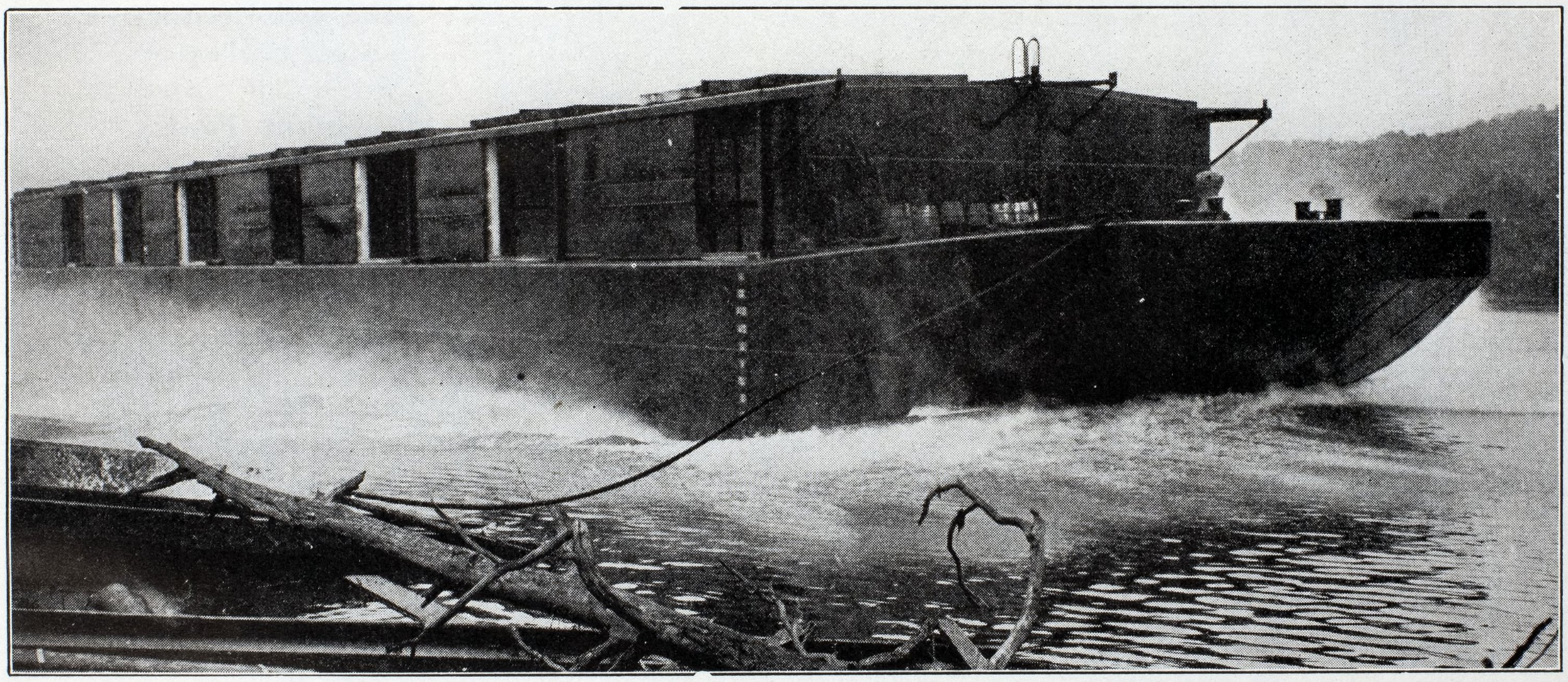
For Twenty-six Years



Steel Barge (Covered) for Union Barge Line



Launching of Steel Barge for Inland Waterways, 1929

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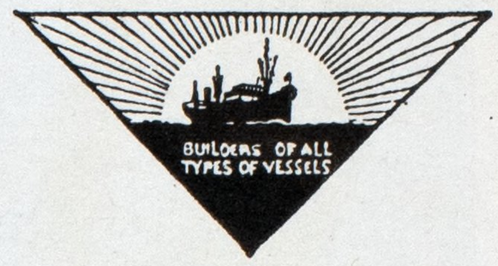
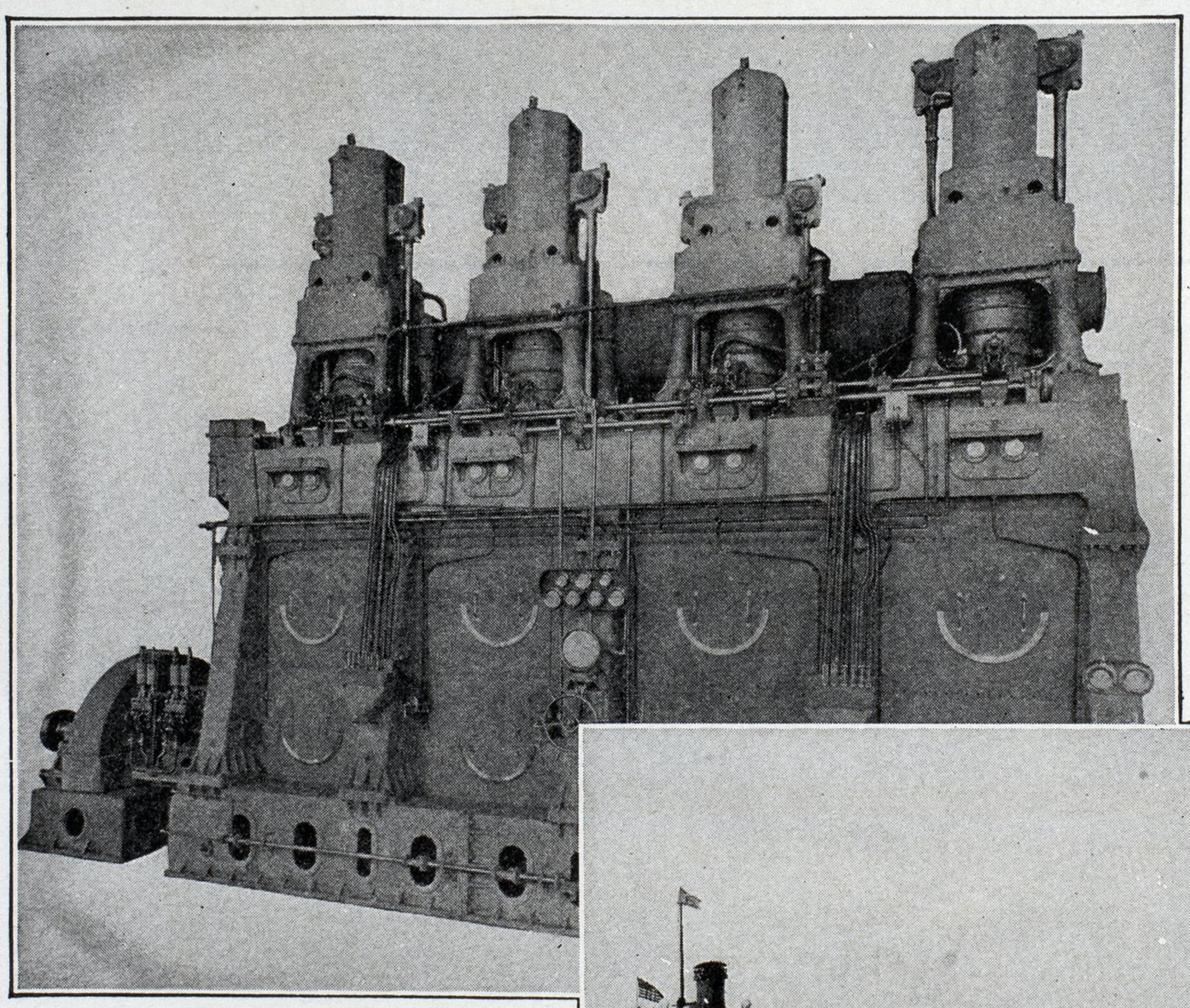


The Engines that Power

"HENRY FORD II" *and* "BENSON FORD"



3000 S. H. P. Sun-Doxford Diesel Engines power the two motorships, "Henry Ford II" and "Benson Ford".

M. S. "Henry Ford II"

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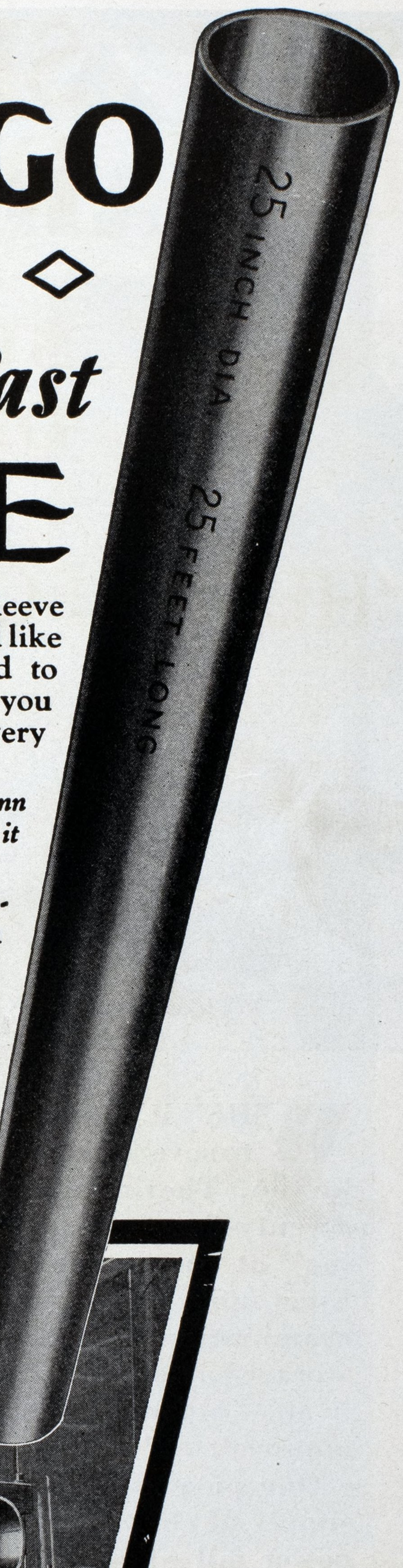
BRONZE



Suppose you required a 23′ 8″ bronze sleeve 22½″ rough turned and 20″ finished-bored like the 6,300 pounder we recently shipped to Brooklyn, as shown below, and suppose you were in a great rush and required delivery in two weeks.

You could place the order with Shenango-Penn and be perfectly confident that you would get it exactly as specified—and on time.

Because of the exclusive Shenango-Penn centrifugal casting method you would also be assured of a sleeve that was perfect in grain structure and density from end to end.

Let us acquaint you with the facts

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PITTSBURGH, PENNA.
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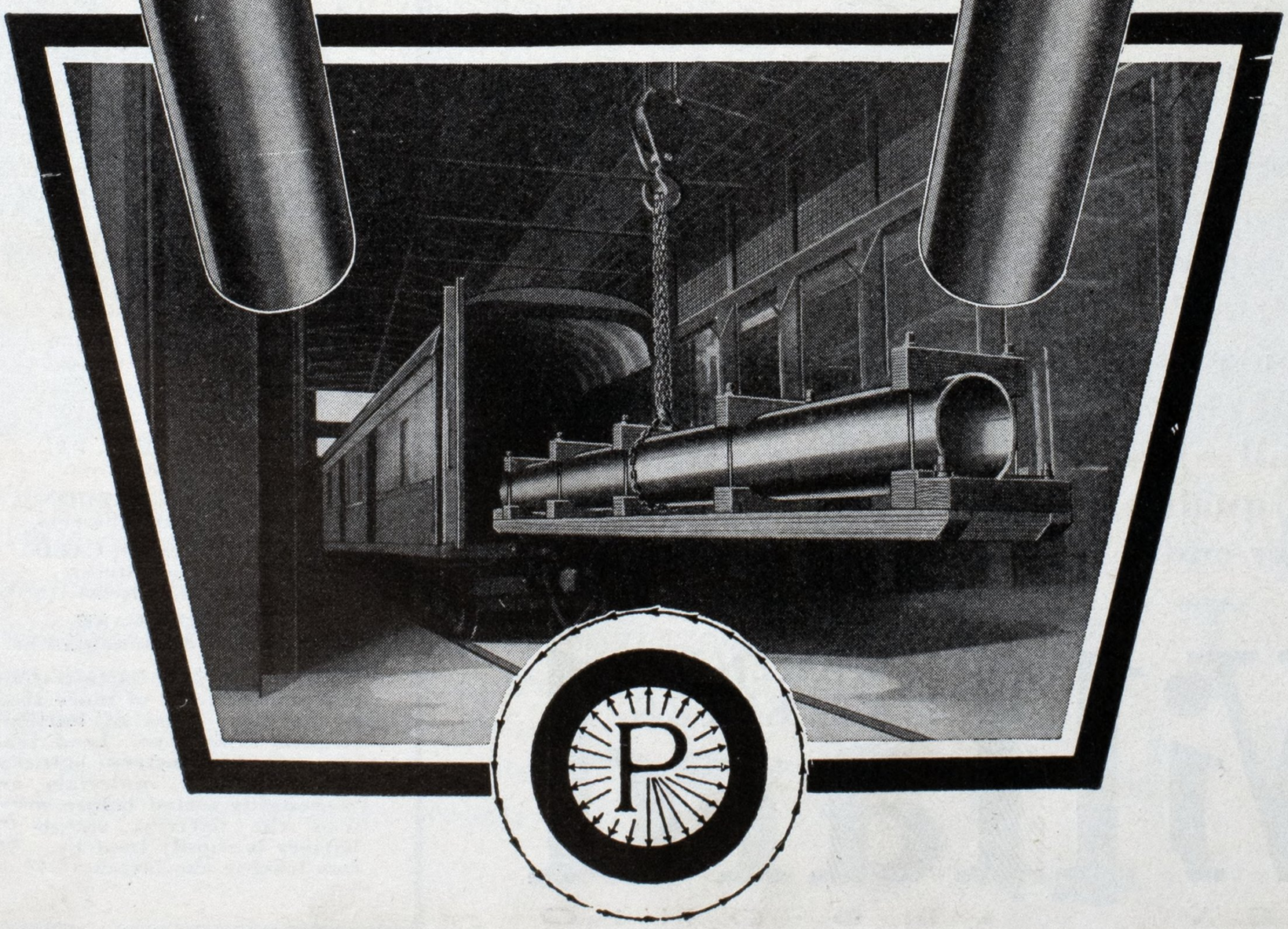

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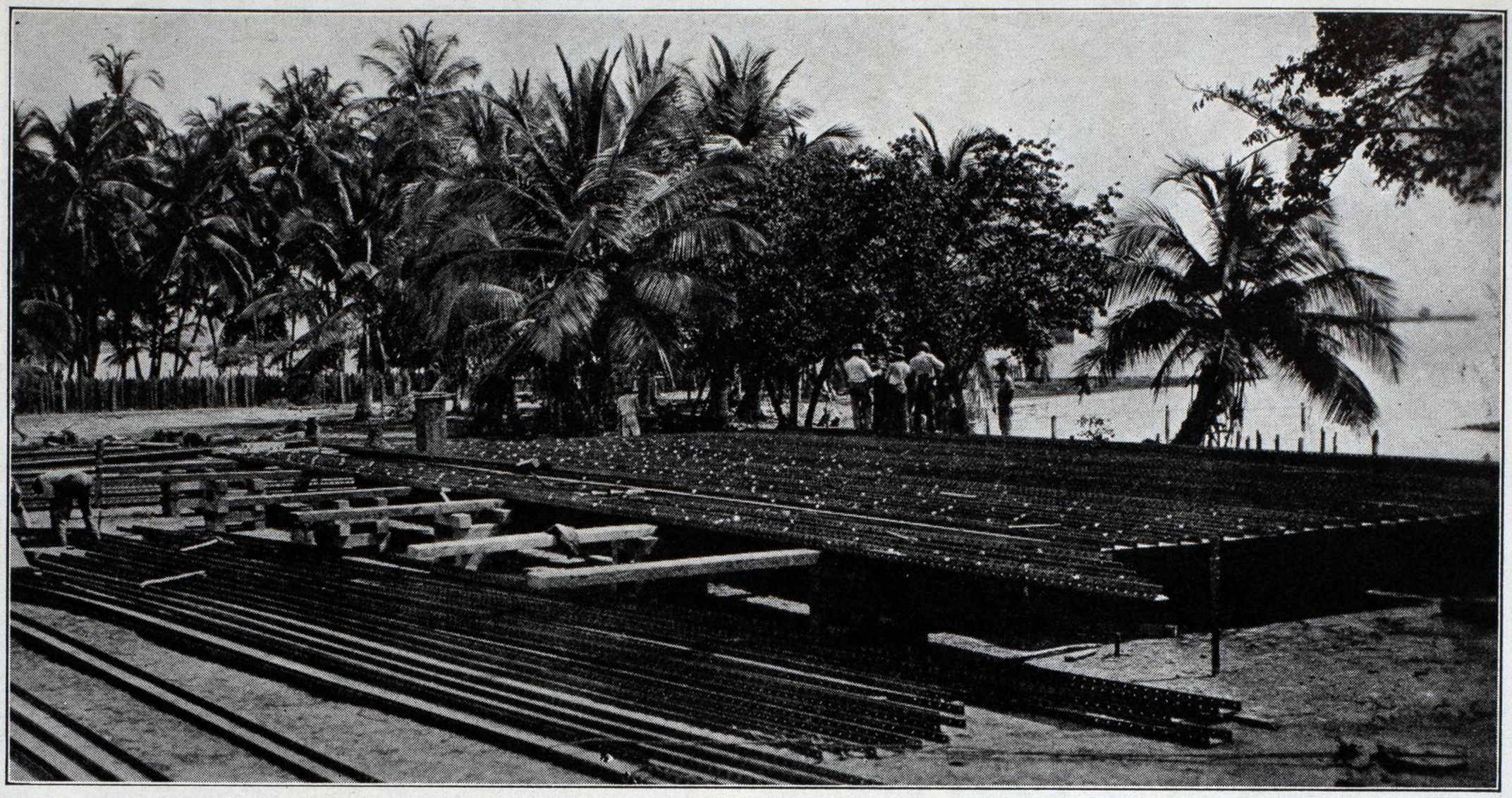

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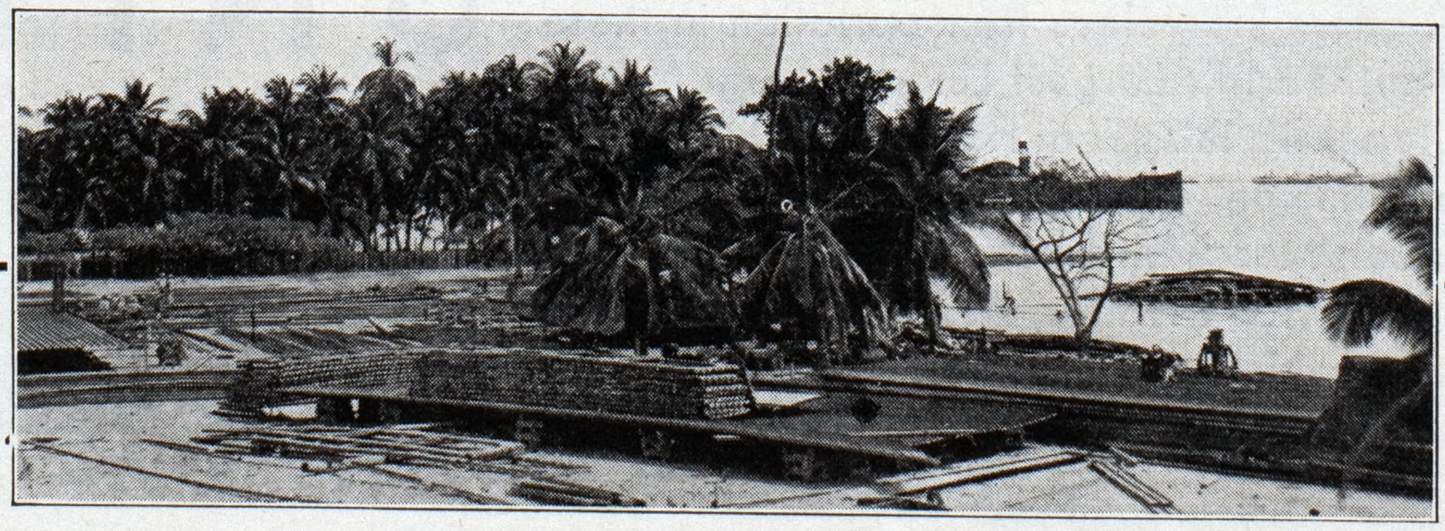

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has no regard for conditions. It is the toughest, sturdiest Manila Line on the market. Into it is spun more service per dollar than is obtainable in any towing line.

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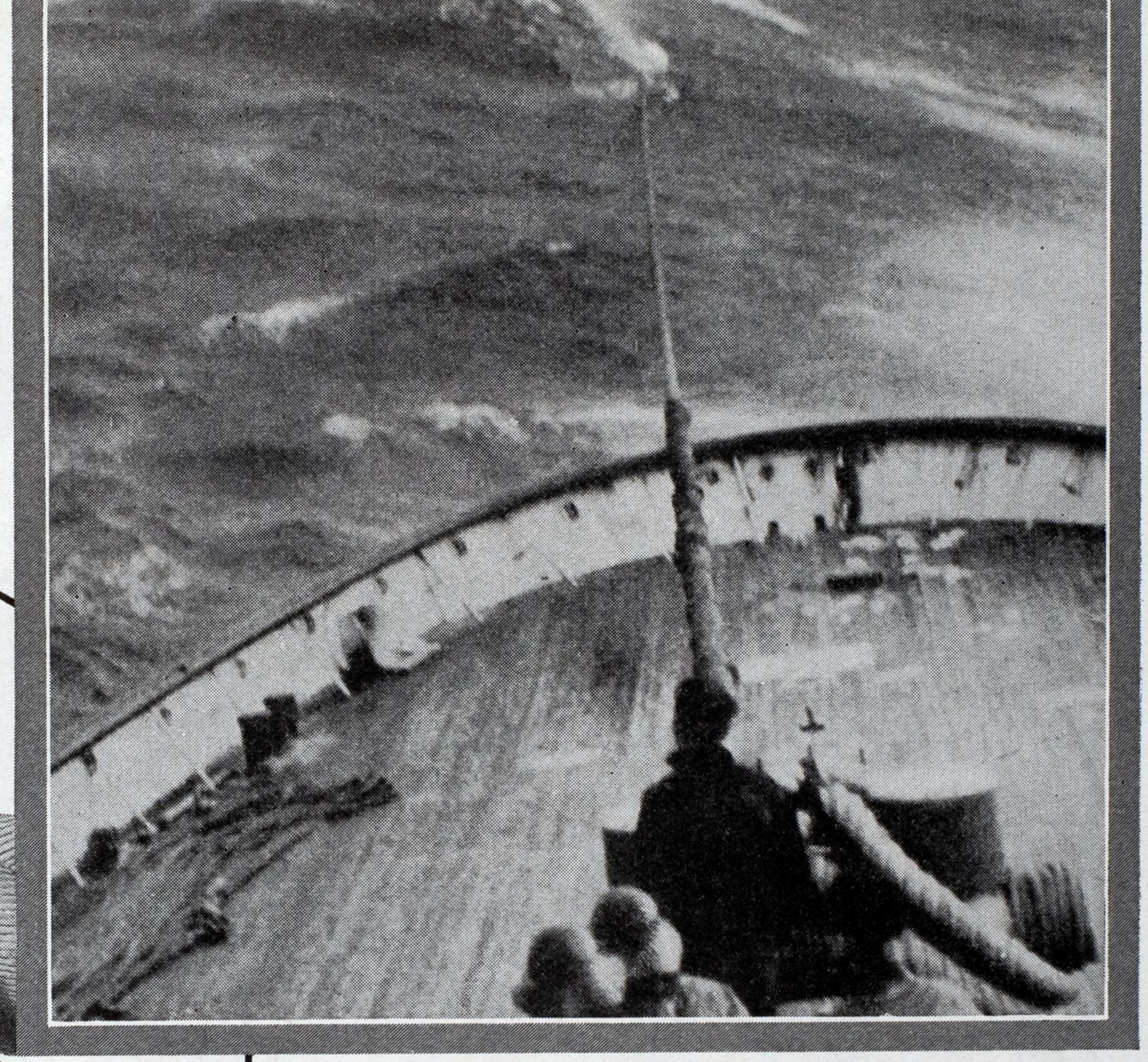

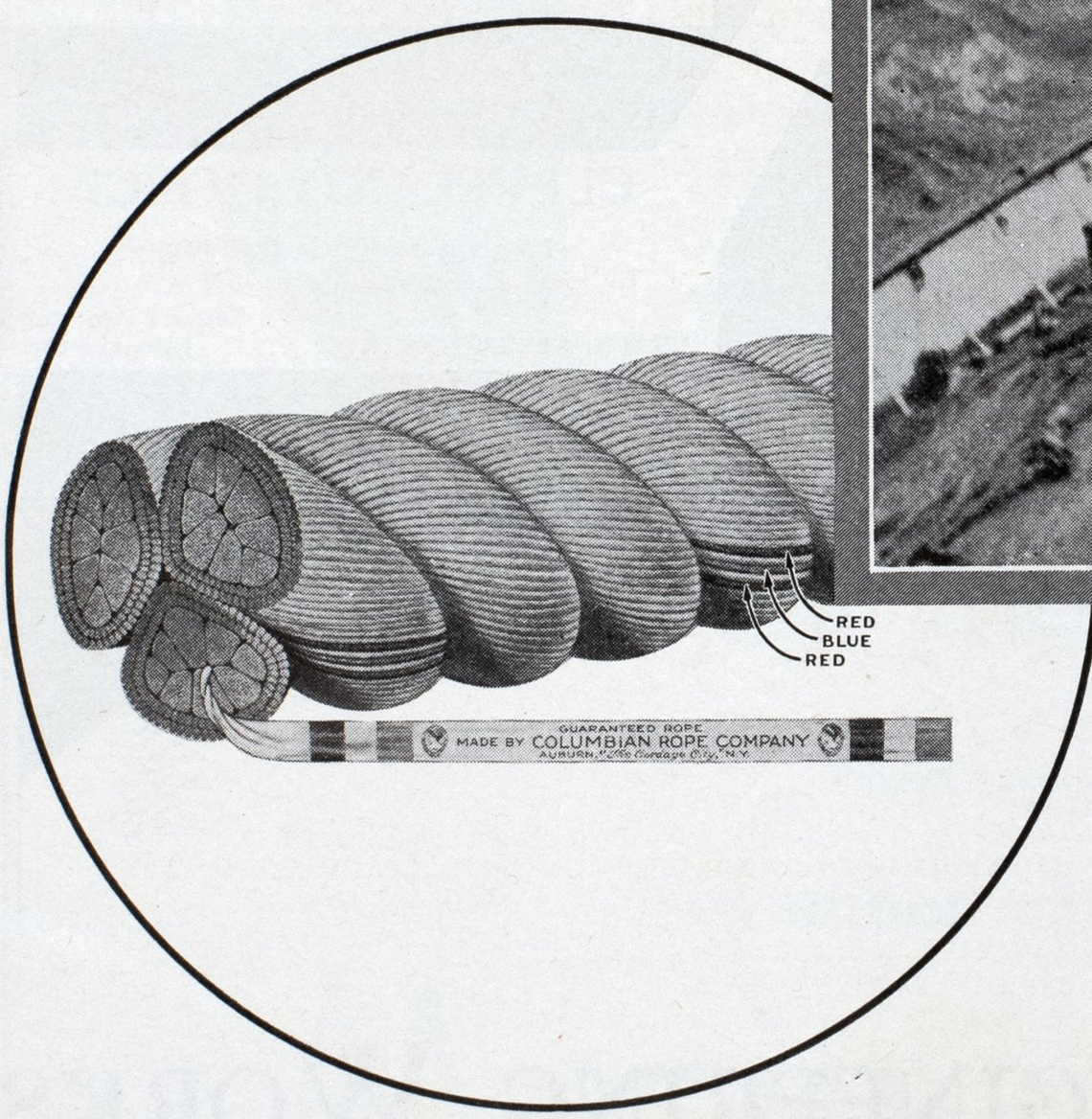

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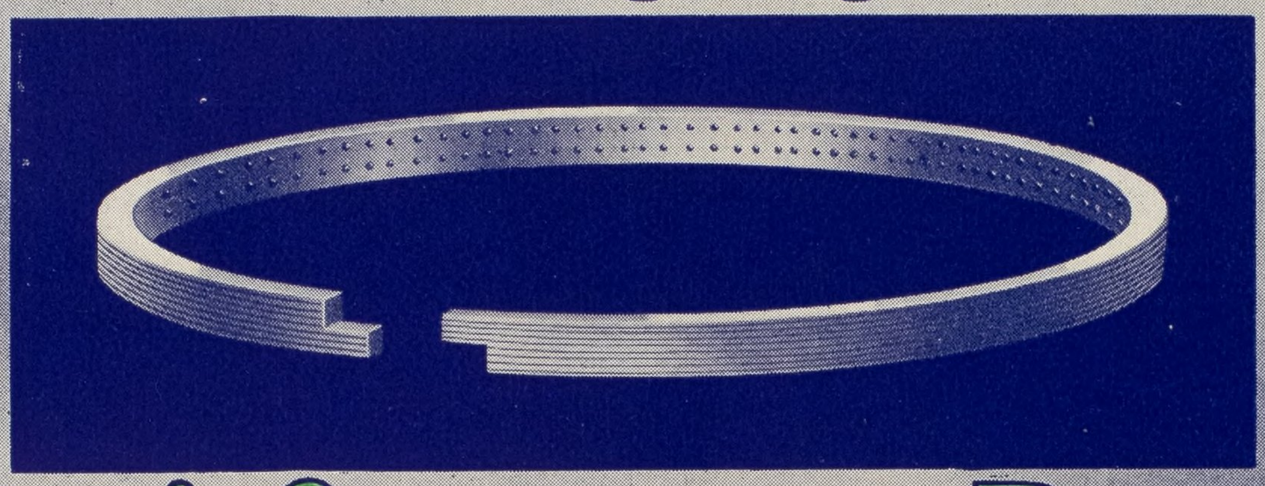

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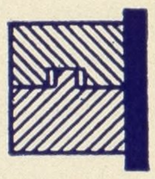
Cross Section of Special Rings Furnished When Required

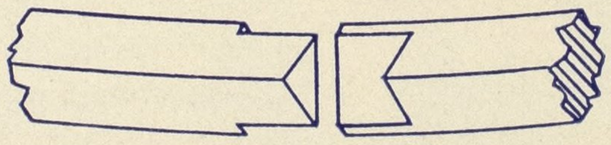


Daros Duplex Ring

Cronin Inner Seal Ring

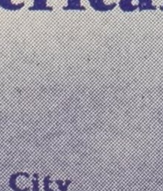
Two-Piece Seal Ring

Three-Piece Compressor Ring



Step Seal Ring

Duplex Steam Ring



Daros Wearing Ring
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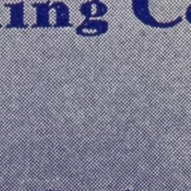
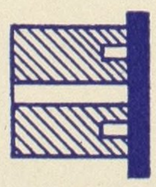
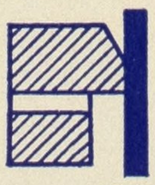


Contracting Rings
Hammered on Outside Diameter

OIL RINGS



Ventilated



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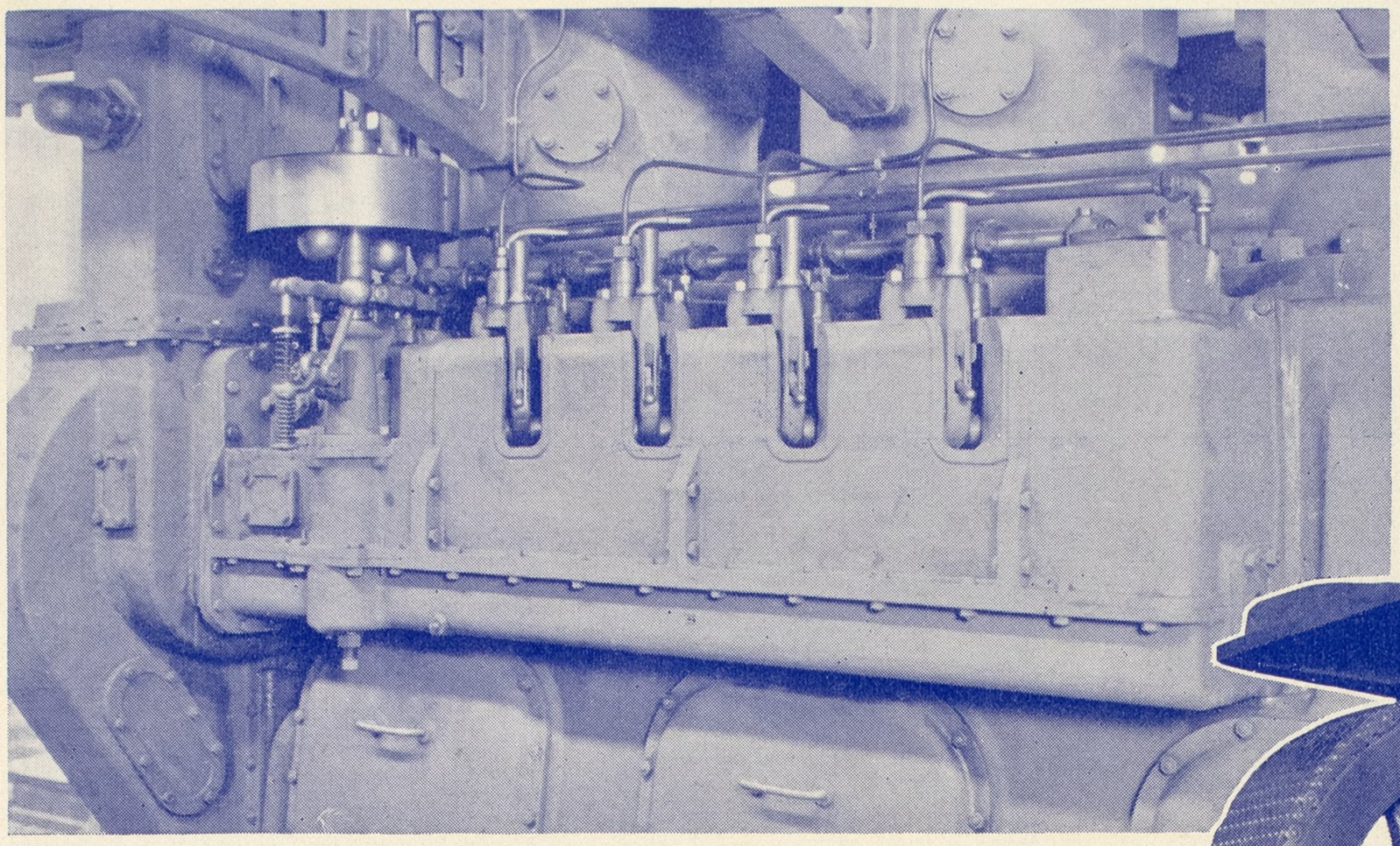
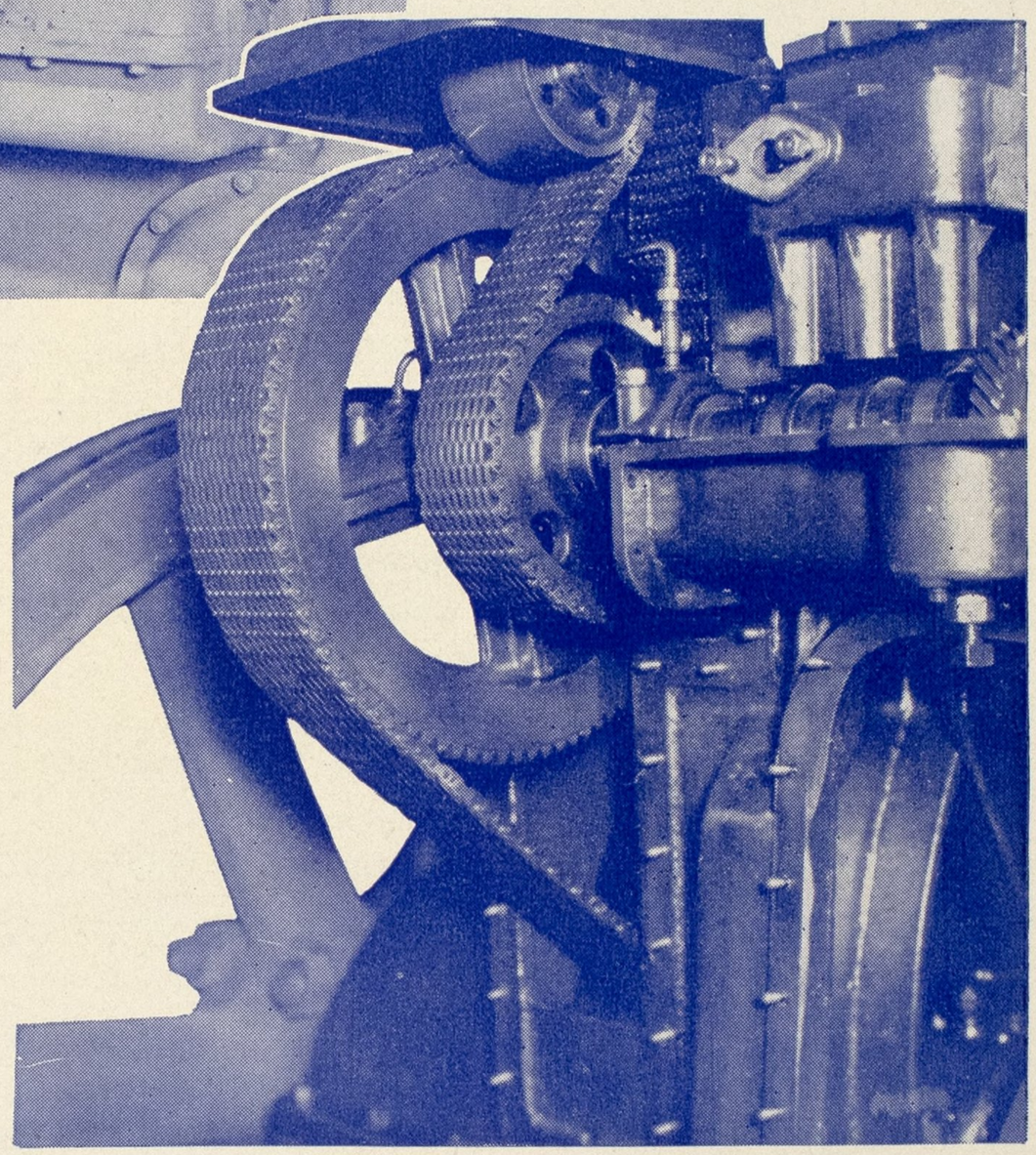
De La Vergne Diesel Engines

in the M. S. Tidewater



Showing simplicity and accessibility of starting and operating mechanism.

Silent chain drive for timing gear.



THE reliable and economical operation of the De La Vergne Diesel engine in stationary service makes its entrance into the marine field a natural result. The success of our first sea-going installation—the M.S. "TIDEWATER"—resulted in a duplicate order from the Tide Water Oil Company. The second vessel is now building at the Pusey & Jones Yard in Wilmington, Delaware, and will go into service in the spring of 1930.

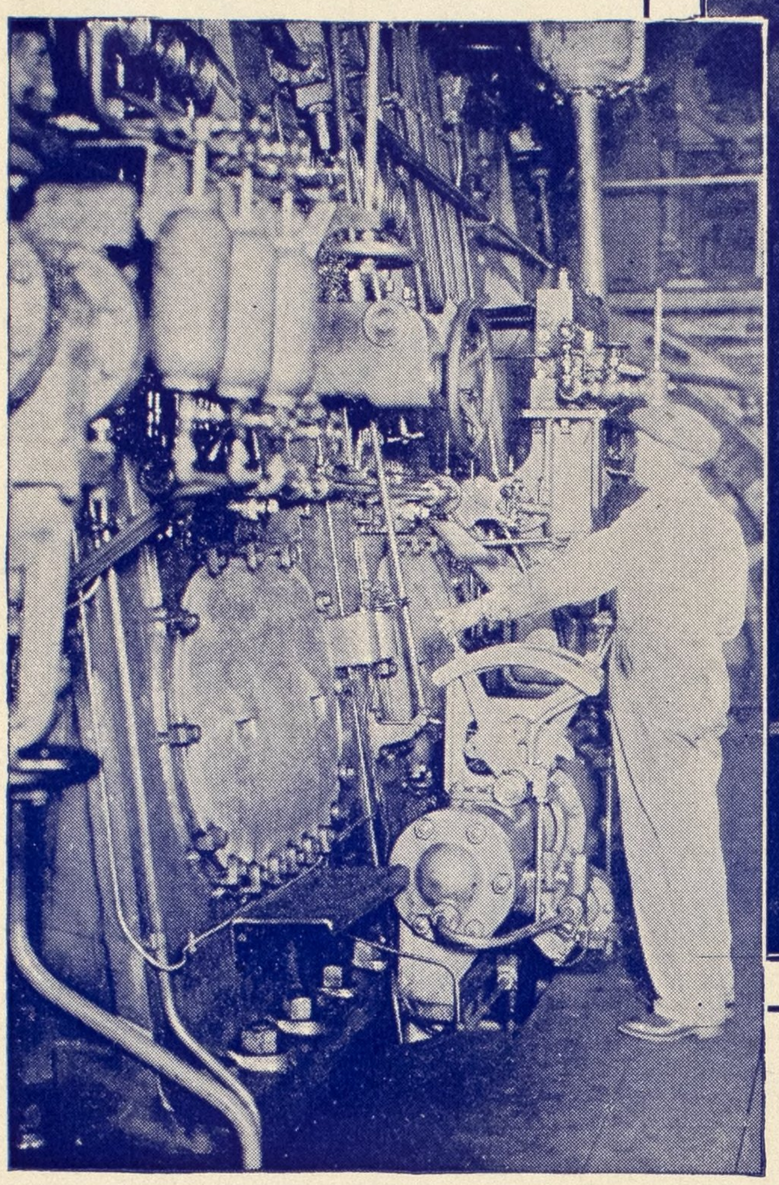
The engines in the M.S. "TIDEWATER" are 6-cylinder, 625 B.HP., rotating at 225 r.p.m., and operate on the De La Vergne solid injection principle. Aside from advantages inherent in this system of fuel injection, the engines are extremely quiet as a result of close tolerances in all working parts and the use of silent chain driven camshafts.

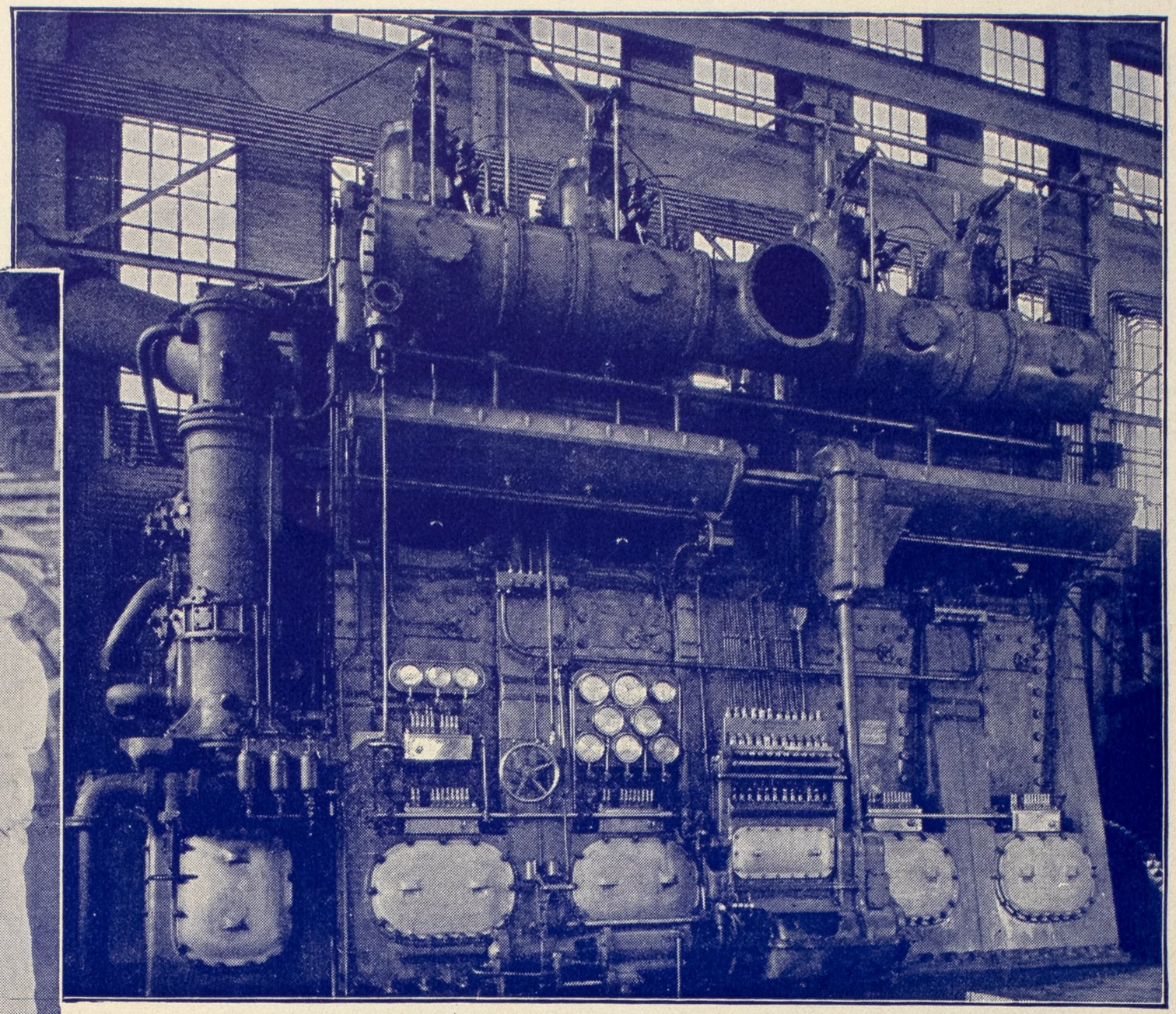
DE LA VERGNE engines are built for Diesel electric drive in sizes from 250 B.HP. to 1500 B.HP. and for direct reversing in 6 and 8-cylinder engines in the following sizes: 400, 535, 600, 660, 800, 880, 1140 and 1500 B.HP.

I. P. MORRIS & DE LA VERGNE, INC.

RICHMOND & NORRIS STS., PHILADELPHIA, PA.

Worthington four-cylinder double-acting two-cycle air injection Diesel Engine built for the converted Motorship Potter. *3625 b. hp. at 115 r.p.m.*





Two more
Worthington-powered Motorships
for United States Shipping Board

WHEN the *Potter* and *Jeff Davis* go into service, two more Worthington Diesel Engines will have the opportunity to prove their worth to the shipping industry.

Masters and Engineers of Worthington Diesel-powered ships soon learn that into each Worthington Engine are built those components which result in reliable performance, steadily maintained.

What are those components? Partially an experience of twenty-seven years in building Diesel engines . . . and partially a pride in good workmanship which dominates each step of Worthington manufacture.

Worthington Diesel Engine design has attained world-wide recognition. This is emphasized by the fact that Carels Freres, Ghent, Belgium, is building these engines under a license from Worthington.

In sizes of 50 to 10,000 hp., Worthington builds Diesels for propulsion and auxiliary services . . . and the Worthington Marine Division offers you every cooperation in a study of your power problems, without obligation on your part.

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COMPRESSORS
CONDENSERS *and* Auxiliaries
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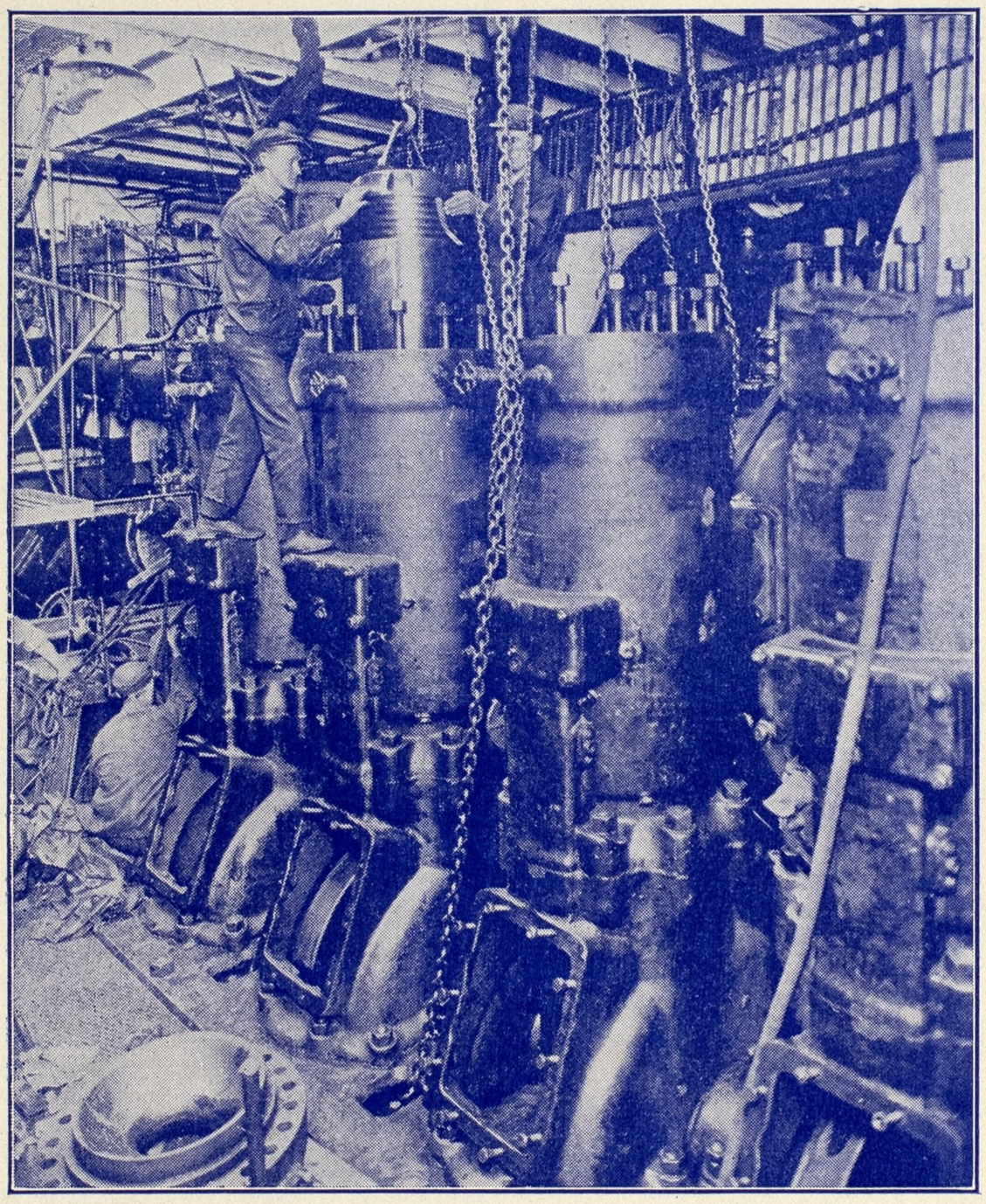
WORTHINGTON

Diesel Engines Deserve to be



THERE ought not to be any tinkering with the vitals of a motorship.

Sound judgment dictates that the repair of a Diesel engine be entrusted to Diesel experts.

United's Diesel division has grown with the motorship, and its staff of mechanics has attained peak efficiency through years of experience with every type of motor.

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UNITED DRY DOCKS

Incorporated

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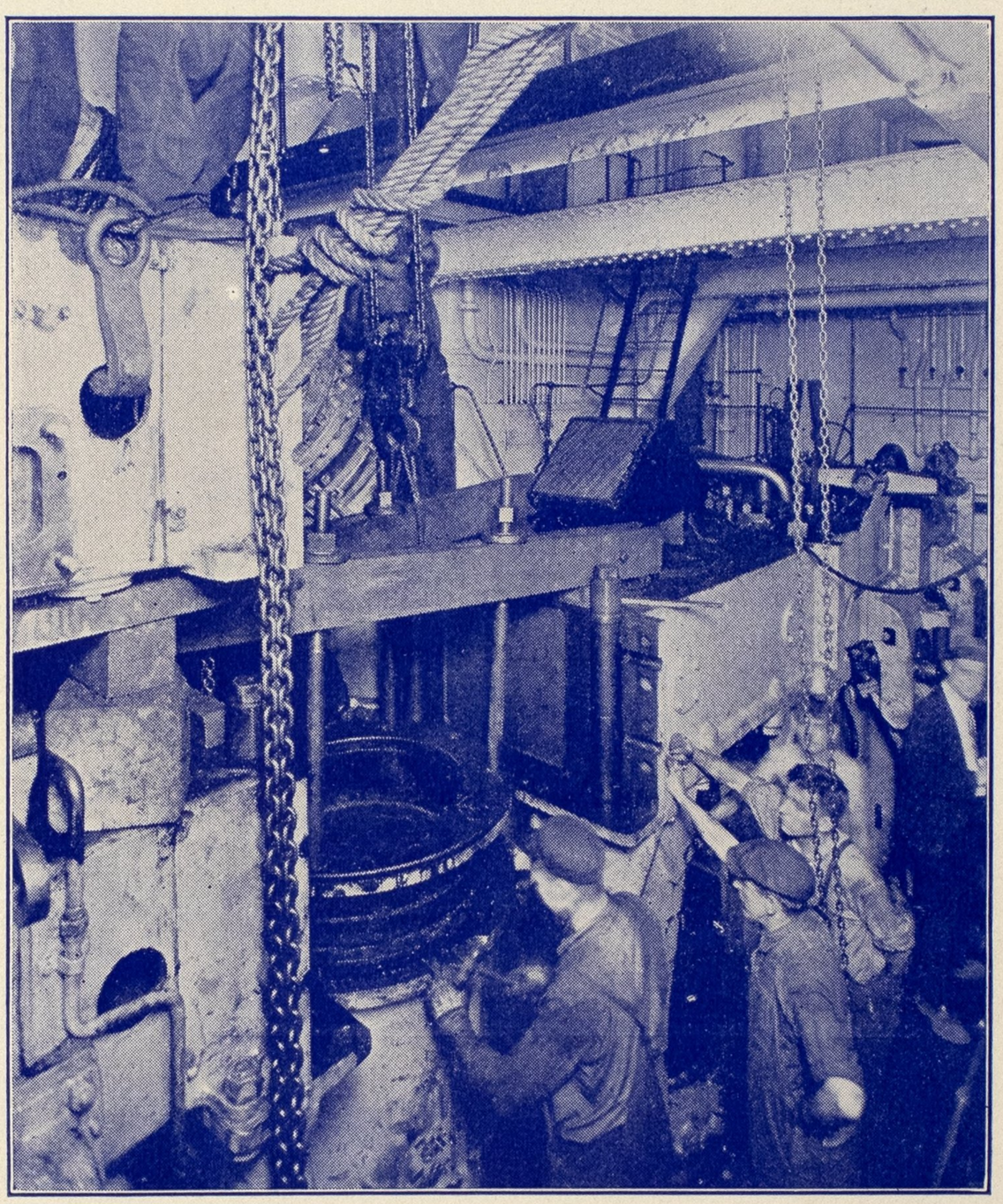
Repaired by Diesel Experts

this staff under the direction of Mr. Louis R. Ford, one of the country's noted engineers, is available as a part of United's service to operators who desire to maintain close touch with this enlarging field.

The Diesel division has developed a variety of special equipment to care for any repair or conversion project, so that it maintains United's standard: "Prompt, efficient service."



UNITED DRY DOCKS

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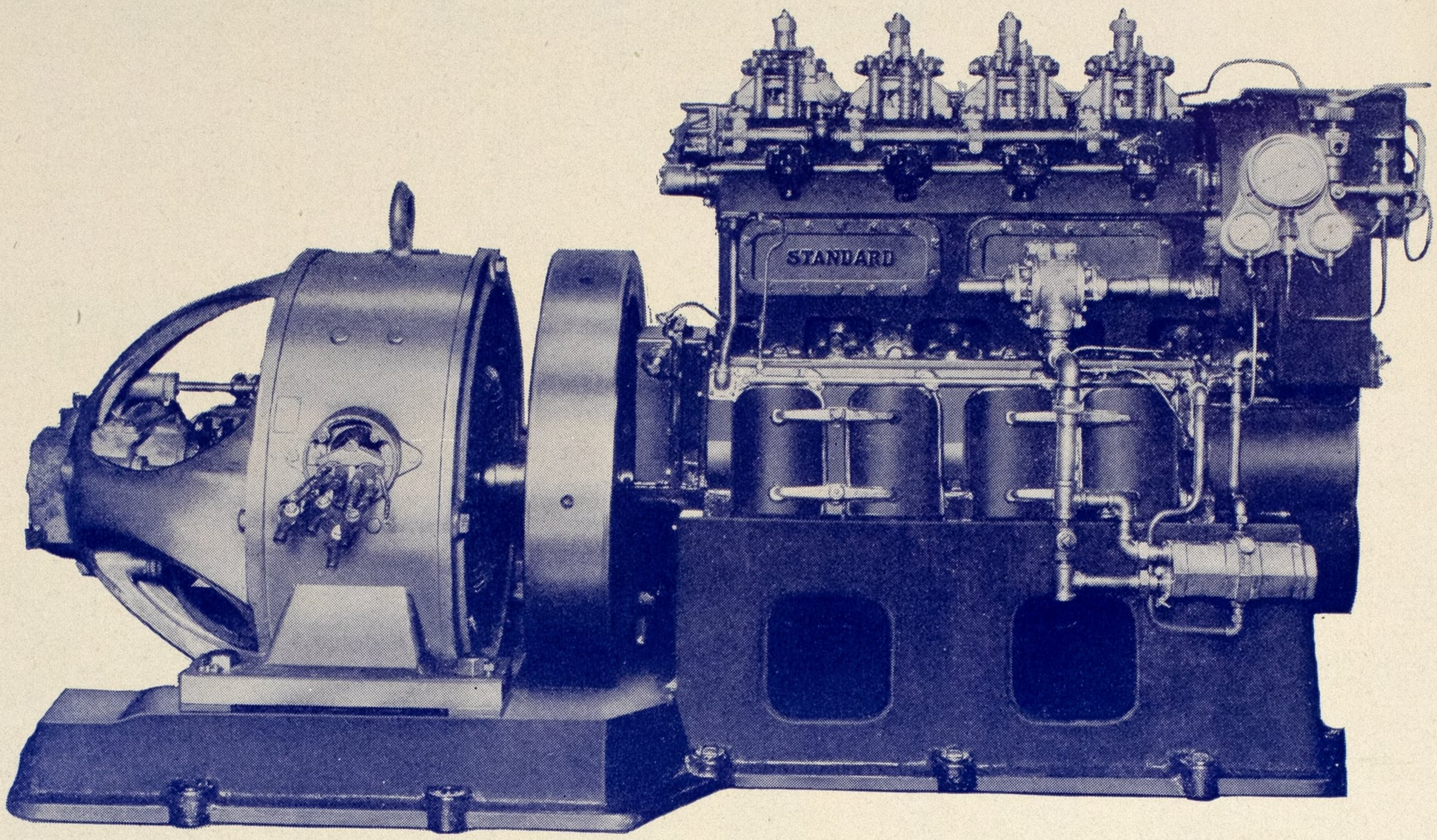


STANDARD Diesel Engine Driven Electric Generating Set direct connected to 35 k.w. Westinghouse generator.

THREE of these sets operating in parallel have just been installed in the new Gulf Refining Co. tanker "No Nox." Standard Diesels also propel her.

Remarkably close governing controls the output of power for cargo pumps, lighting and steering, one set being always in operation. So perfect is the adjustment that the paralleling has been pronounced 100 per cent.

STANDARD DIESELS FOR SERVICE

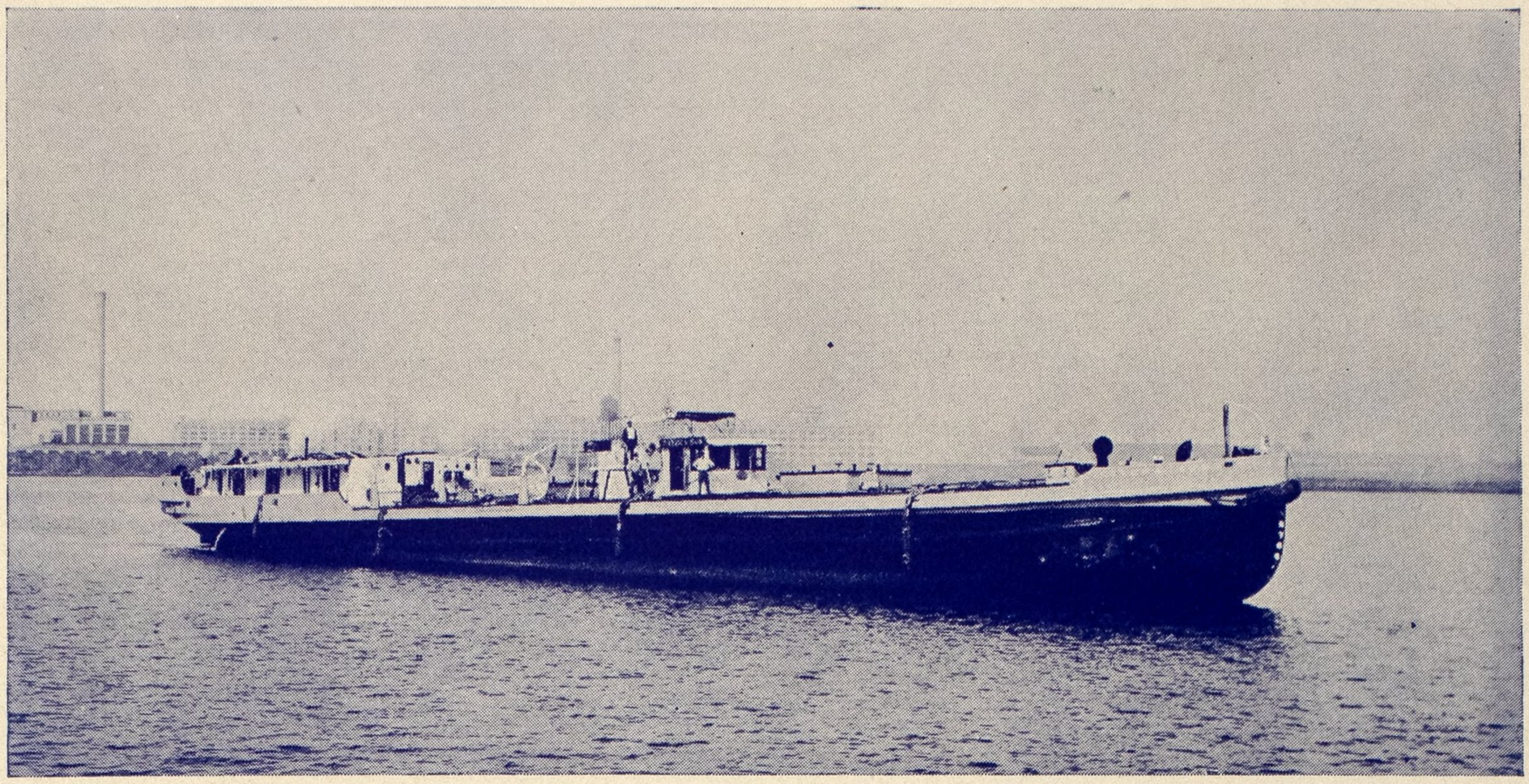
We would appreciate the opportunity of quoting you on your electric generator requirements using our remarkable solid injection small full Diesel engine.

STANDARD MOTOR CONSTRUCTION CO.

Let Us Quote You

184 Whiton Street
Jersey City, N. J.

The Cayuga Sun, small Diesel electric oil tanker of the Sun Oil Company, designed especially for service on the New York State Barge Canal.



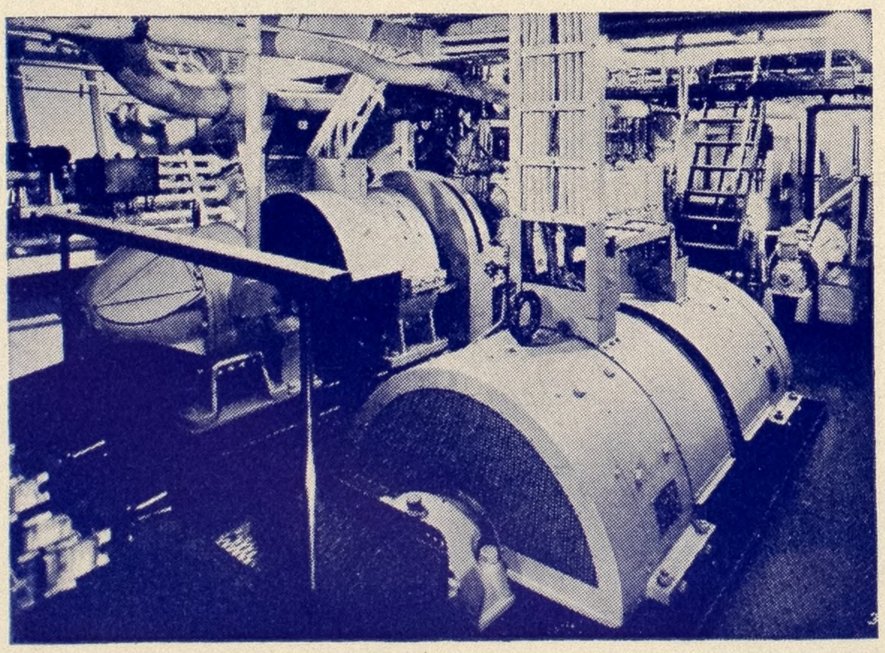
Carrying oil on the rivers

THE advantages of the rapid and economical transportation offered by our recently improved canals and rivers are quickly being recognized by inland shippers. Already two large oil companies have built three small tankers of 320 shp. each, designed especially for this service.

In this class of tanker operation, ease of maneuvering and the economical generation and flexible distribution of the large auxiliary load required, are of major importance. That Diesel electric propulsion was selected for all three of these vessels is indicative of the particular adaptability of this type of drive for tankers in this service.

The Westinghouse Company, which has designed and manufactured the electrical equipment of several Diesel electric tankers of this size and horsepower, will supply the generators, motors and control of the three new ships.

An engine room view of the Cayuga Sun, showing propelling motor in foreground and one of the two main generating units in the background.



WESTINGHOUSE ELECTRIC & MFG. COMPANY
EAST PITTSBURGH PENNSYLVANIA

SALES OFFICES AND SERVICE SHOPS IN ALL PRINCIPAL CITIES OF THE UNITED STATES

Westinghouse

T 3083

Products for the Marine Industry include:

Turbine Electric Propulsion
Diesel Electric Propulsion
Geared Turbine Propulsion
Condensers
Switchboards
Instruments
Auxiliary Turbine Generators
Auxiliary Motors and Contro
Electric Cooking Appliances
Electric Ranges and Ovens
Electric Wall Heaters
Electric Fans

Engine Performance that is Measured by the Calendar

WHEN ships ply seaward for profit there is no substitute for unfailing power. When profits are dependent on engine performance there is no substitute for Bessemer diesel power.

On cargo vessels, tankers, fishing vessels, tugs, tow boats, ferries, or dredges you will inevitably find that a Bessemers' performance is measured by the calendar; you will find a Bessemer working on from year to year—smoothly, economically, unfalteringly.

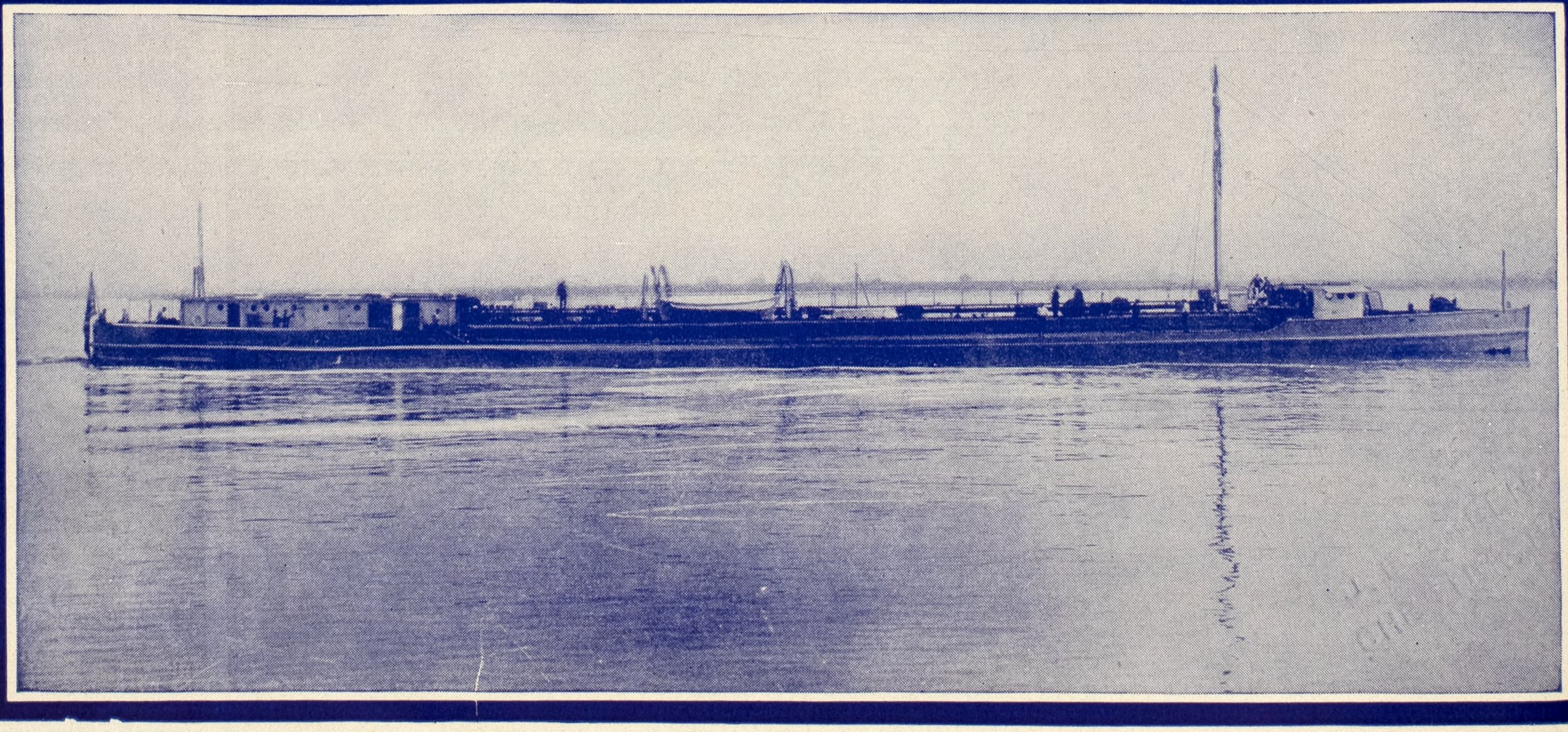
For example, a Bessemer powered tanker operated for two years before a head was removed; an east coast ferry has been plying back and forth for three years without a single forced shutdown; a cargo vessel has been working in South American waters for more than two years without a single major parts replacement, and so on down the list.

It is such year-around performance as this that has established the leadership of Bessemer diesel engines in the commercial marine field.

THE COOPER-BESSEMER CORPORATION

General Diesel Sales Offices: 25 W. 43rd St., Suite 301, New York City
Factory: Grove City, Pa.

***The Sun Oil Co.** tanker which operated for two years without a major repair or replacement to its Bessemer diesel power plant*



BESSEMER

Another MANITOWOC PRODUCT

THE 8 cu. yd. Diesel Electric Dipper Dredge MOGUL was built for Great Lakes Dredge & Dock Co., Chicago. It is equipped with a 12 cu. yd. dipper for ordinary work but will heap up to a load of 16 yards in lighter materials. An 8 cu. yd. dipper is used for dredging rock. Maximum digging depth is 42 ft. of water. The MOGUL is 156′0″ x 42′6″ x 12′8″—1200 H.P., equipped with Bucyrus-Erie dredging machinery and Busch Sulzer Diesel engine. It has living quarters for a crew of twenty-three men.

It will pay you to consult Manitowoc when in the market for dredges, steel passenger and freight vessels, carferries, tankers, fire boats, sand suckers, tugs, scows, lighters, marine engines, marine boilers, ship auxiliary equipment, etc.

MANITOWOC SHIPBUILDING CORPORATION

Manitowoc, Wisconsin

Specialists in DIESEL ENGINE Crankshafts and Forgings

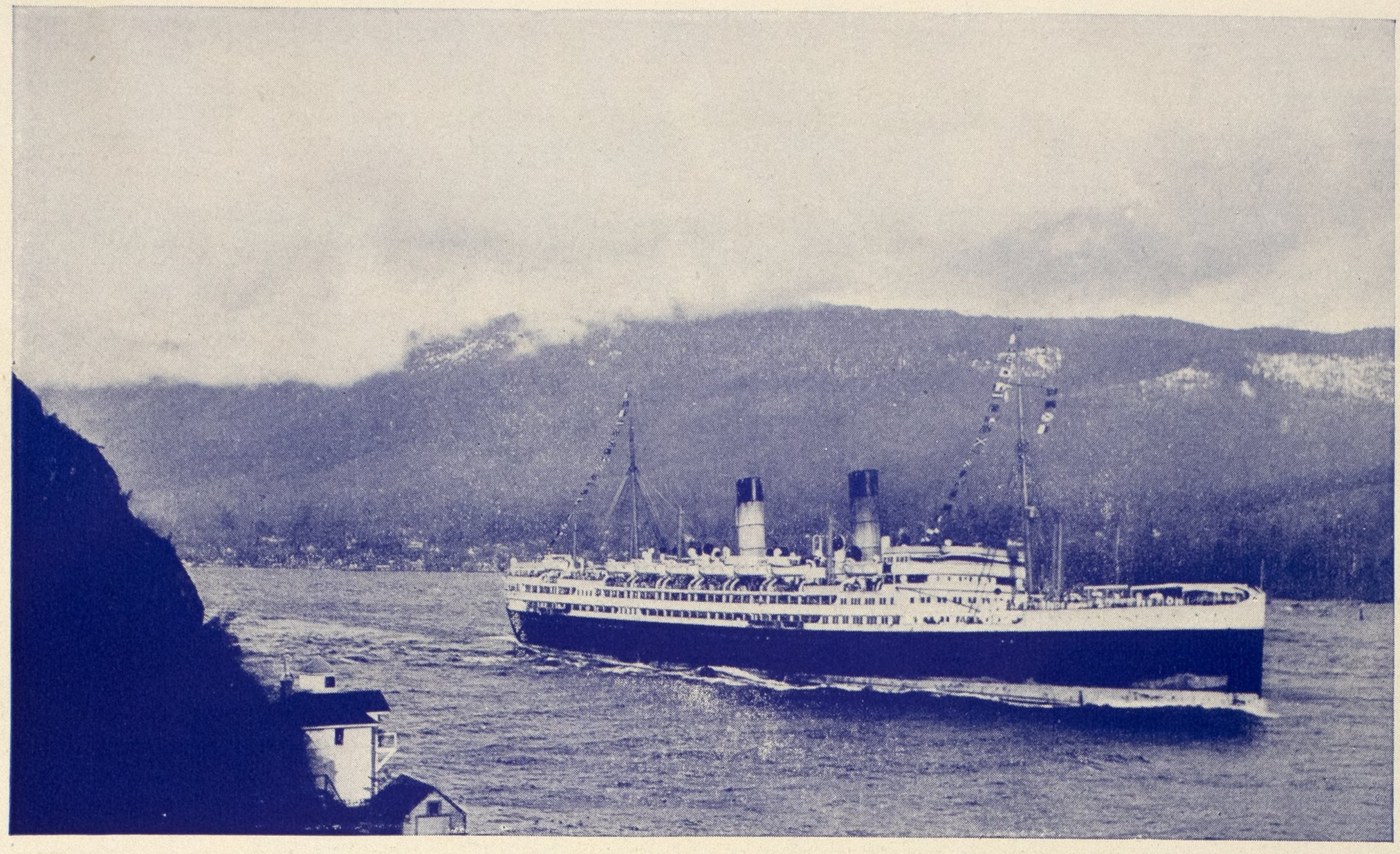
Since the first Diesels were built in this country

We also specialize in Marine Forgings of all kinds—and operate a steel foundry for the production of high grade steel castings.

— — —

Erie Forge Company

Erie, Penna.



The Motor Liner "AORANGI", 22,000 tons, built by the Fairfield Shipbuilding & Engineering Co., Ltd., having completed

450,000 MILES

has recently undergone an overhaul in Sydney, lasting about 4 weeks, and on the voyage from Auckland to Vancouver following this made

A record passage

Averaging 17.34 Knots

The M. S. "AORANGI" is engined with the well known Sulzer type of single acting 2-cycle marine Diesel

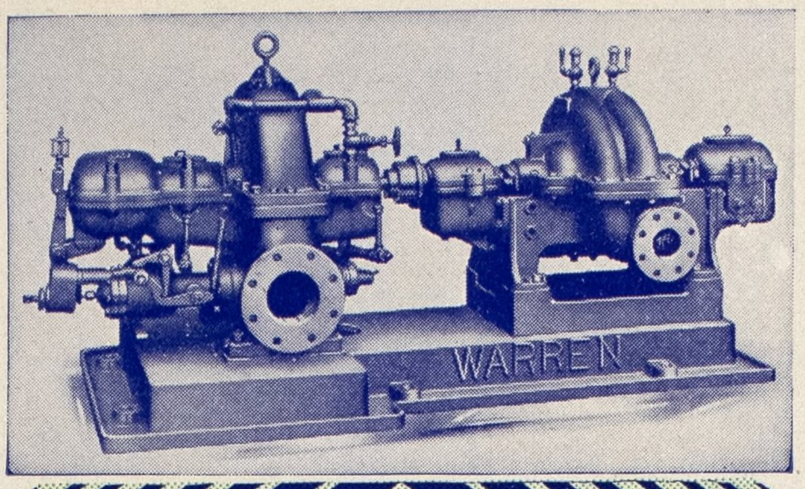
---

BUSCH-SULZER BROS.-DIESEL ENGINE CO.

ST. LOUIS, MO.

Two Rector St.
New York

Rialto Bldg.
San Francisco



One of 10 two-stage Warren Pumps supplied for Coast Guard Cutter Chelan and class.

Typical Ships equipped with WARREN PUMPS

For more than thirty years, Warren Pumps have held the confidence of marine engineers because of their efficient, dependable service under all conditions. Centrifugal and reciprocating types for every purpose . . . Write for Bulletins — include "Warren" in your pump specifications.

MORGAN LINE

S.S. Dixie
S.S. El Oceano
S.S. El Coston

WILSON LINE

S.S. State of Delaware
S.S. State of Pennsylvania

SAVANNAH LINE

S.S. City of Birmingham
S.S. City of Chattanooga

BALTIMORE STEAM PACKET CO.

S.S. President Warfield
S.S. State of Virginia
S.S. State of Maryland

PANAMA-PACIFIC LINE

S.S. California
S.S. Virginia
S.S. Pennsylvania

CHESAPEAKE STEAMSHIP CO.

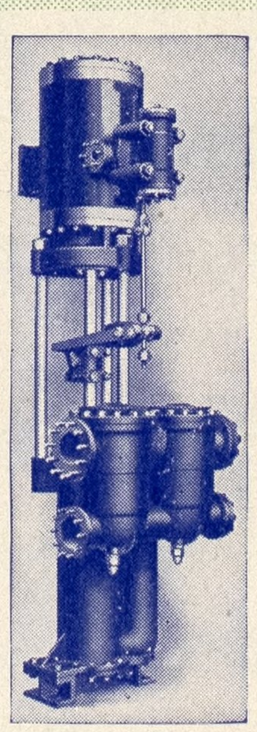
S.S. Yorktown
S.S. City of Norfolk
S.S. City of Baltimore
S.S. City of Richmond

ALASKA STEAMSHIP CO.

S.S. Alaska

GULF REFINING CO.

S.S. Gulfbird
fleet of 29 ships



Warren Vertical Single Feed Pump

MERCHANTS & MINERS TRANSPORTATION CO.

S.S. Allegheny
S.S. Berkshire

AMERICAN-HAWAIIAN STEAMSHIP CO.

S.S. Dakotan
S.S. Iowan
S.S. Minnesotan
S.S. Ohioan
S.S. Panaman
S.S. Pennsylvanian

U.S. COAST GUARD

C.G.Cutter Northland
C.G.Cutter Chelan
C.G.Cutter Tahoe
C.G.Cutter Pontchartrain
C.G.Cutter Mendota
C.G.Cutter Champlain
C.G.Cutter Itasca
C.G.Cutter Sebago
C.G.Cutter Saranac

INTER-ISLAND STEAM NAVIGATION CO.

S.S. Waialeale
S.S. Hualalai
S.S. Humuula

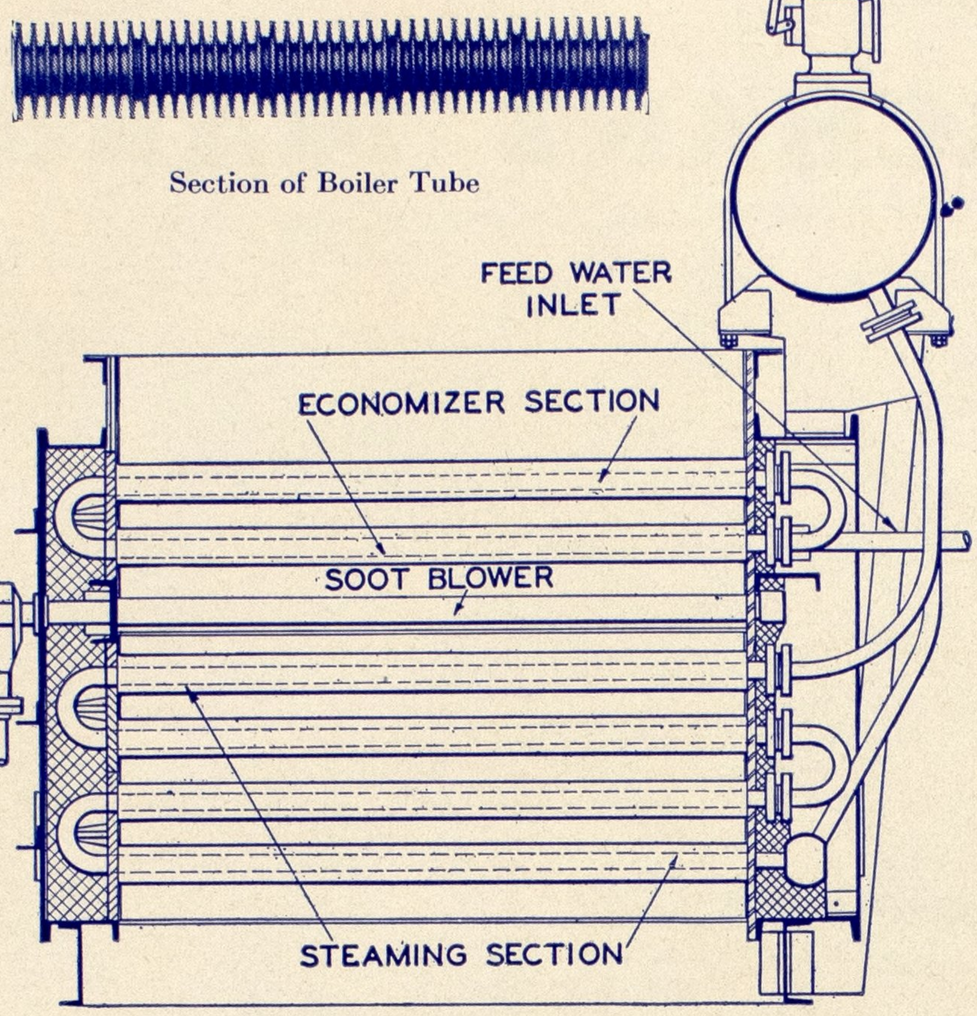
Warren

Steam Pump Company Inc.

Warren Engineering Corp., 117 Liberty Street, New York City
M. L. Katzenstein, President

Warren Massachusetts

Western Engineering Company, 215 Market Street
San Francisco, Cal.



Cross section of Foster Waste Heat boiler used in M. S. "Potter."

M. S. "Potter" of the United States Shipping Board recently put into commission Foster equipped.

Foster Waste Heat Boiler On M. S. "Potter."

Foster waste heat boilers for Diesel engines provide large heating surface and high steaming capacity.

The tubes are covered with cast iron rings and all joints are outside of the gas passage.

The boiler may be run dry without any damage.

Silencing is completed by the installation of an inexpensive auxiliary muffler.

The most durable and compact design yet developed.

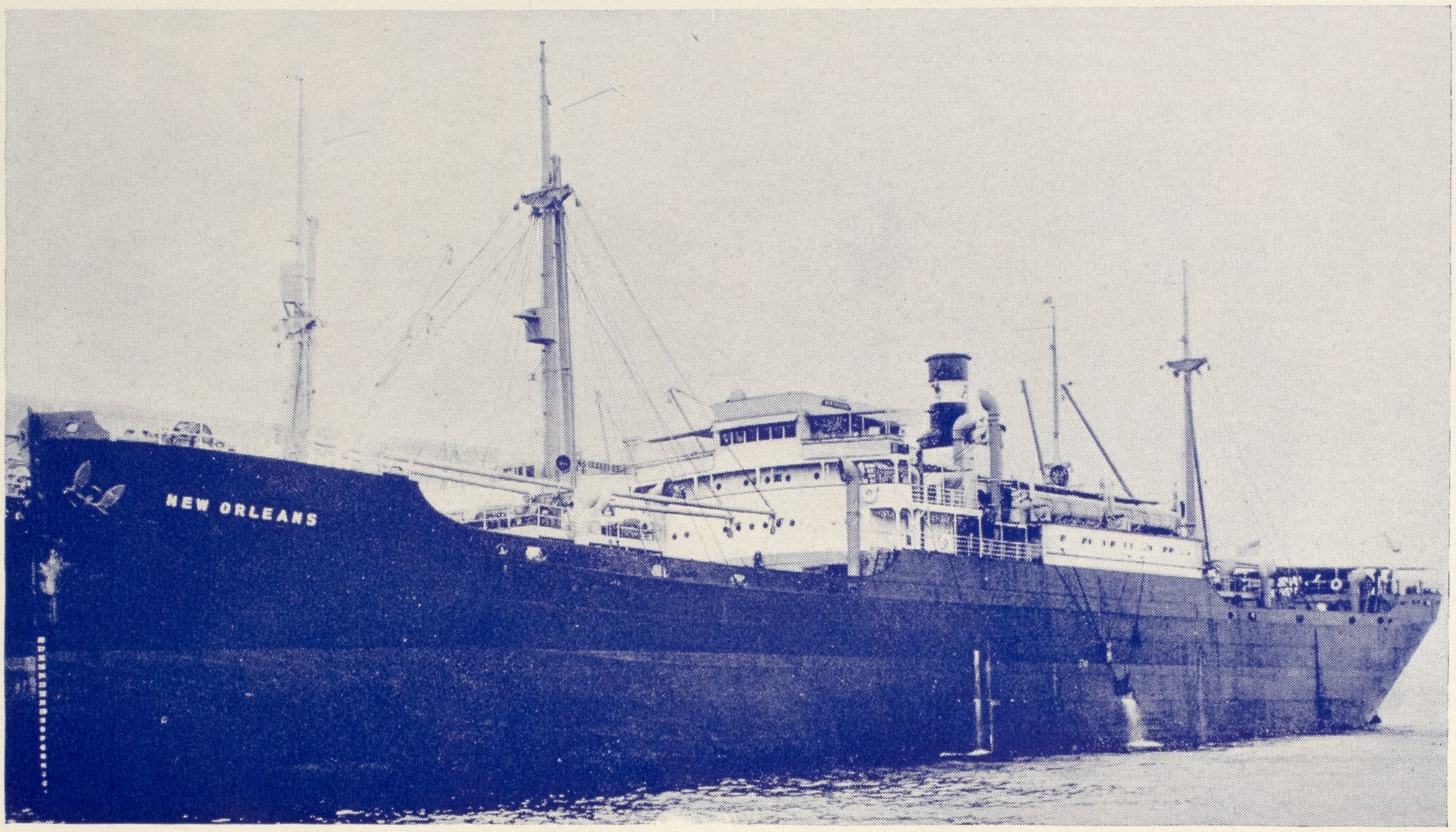
Equipments ordered for a dozen vessels in the first year.

FOSTER WHEELER CORPORATION

165 Broadway, New York, N. Y.

Representatives in principal cities—Canada, Europe, Honolulu

A WORTHY ADDITION
TO THE
AMERICAN MERCHANT MARINE



M. S. NEW ORLEANS

U. S. Shipping Board combination passenger and freight ship converted to direct Diesel drive by installation of Hamilton-M.A.N. Double Acting Two Cycle Engine developing 4000 brake horse power at 110 Revolutions.

The Hooven, Owens, Rentschler Co.

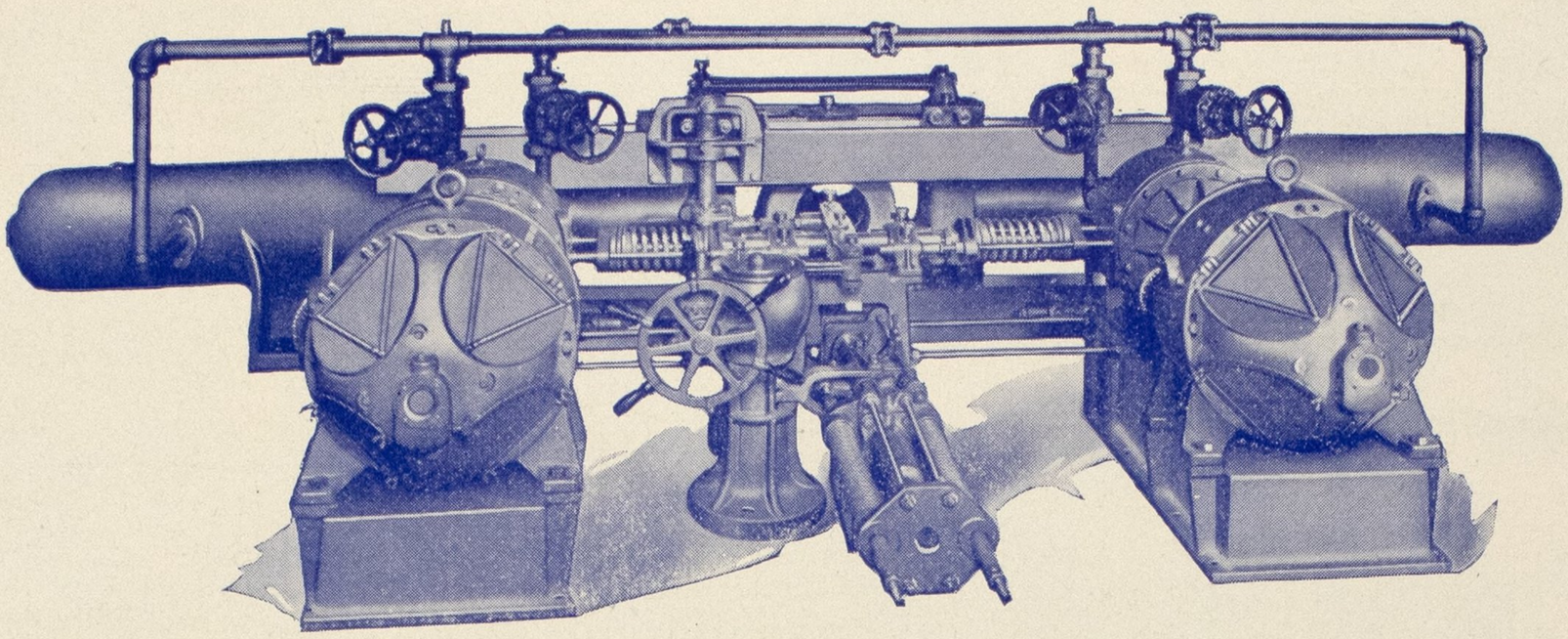
Division of General Machinery Corporation of Delaware

HAMILTON, OHIO

HAMILTON M.A.N. Diesel

For Diesel Boats . . .

A-E-CO AUXILIARIES

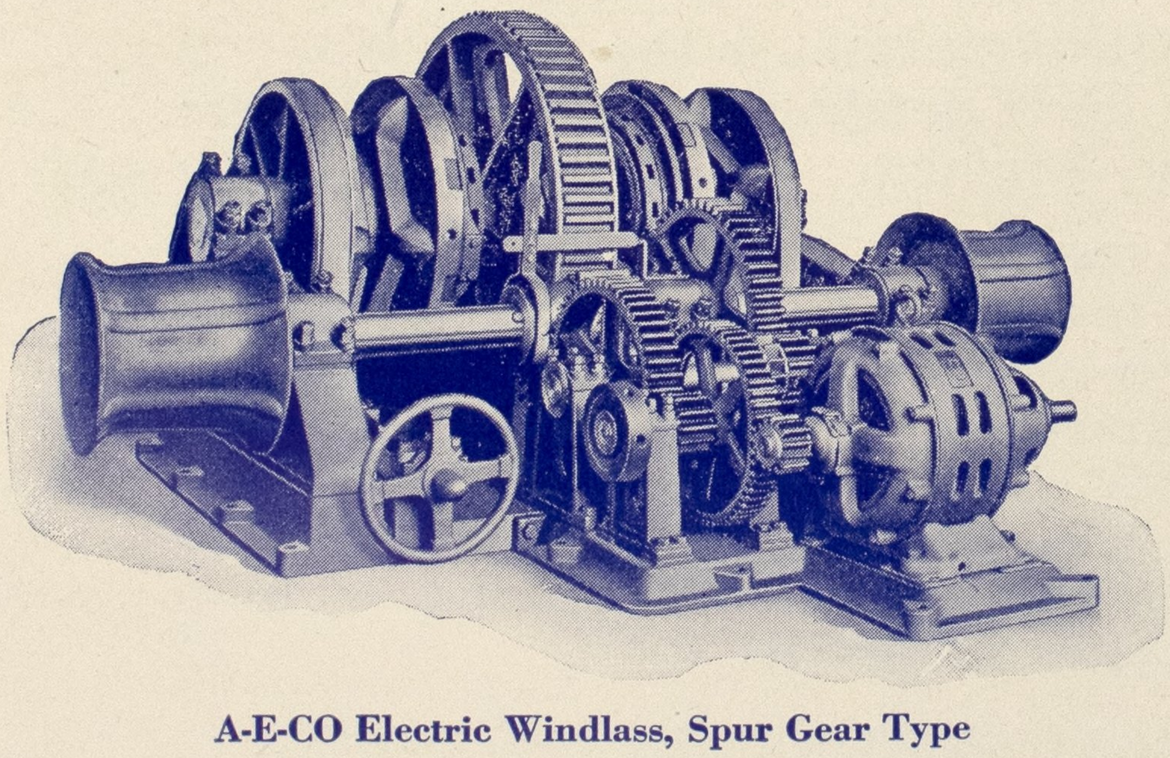


A-E-CO Electro-Hydraulic Steerer of type chosen for
City of New York and *Mary Ellen O'Neill*

Maintaining a 70-year Record of Leadership—

The continued preference of the naval architect, vessel operator and yachtsman for A-E-CO equipment is evidenced by the large number of installations on the outstanding boats of the year.

Recent installations include electro-hydraulic steering gears for the *City of New York*, now being built for the American-South African Lines and *Hull No. 122*, being built by the Sun Shipbuilding Company for the Sun Oil Company; the tanker *Sunoco*, owned by Sun Oil Company; the *Tide Motor*, owned by Tidewater Oil Company; tug *Van Dyke IV*, building for the Atlantic Refining Company; tug *Taggart*, owned by the Reading Company; and tug *New Rochelle* of the Red Star Towing Company's fleet.



A-E-CO Electric Windlass, Spur Gear Type

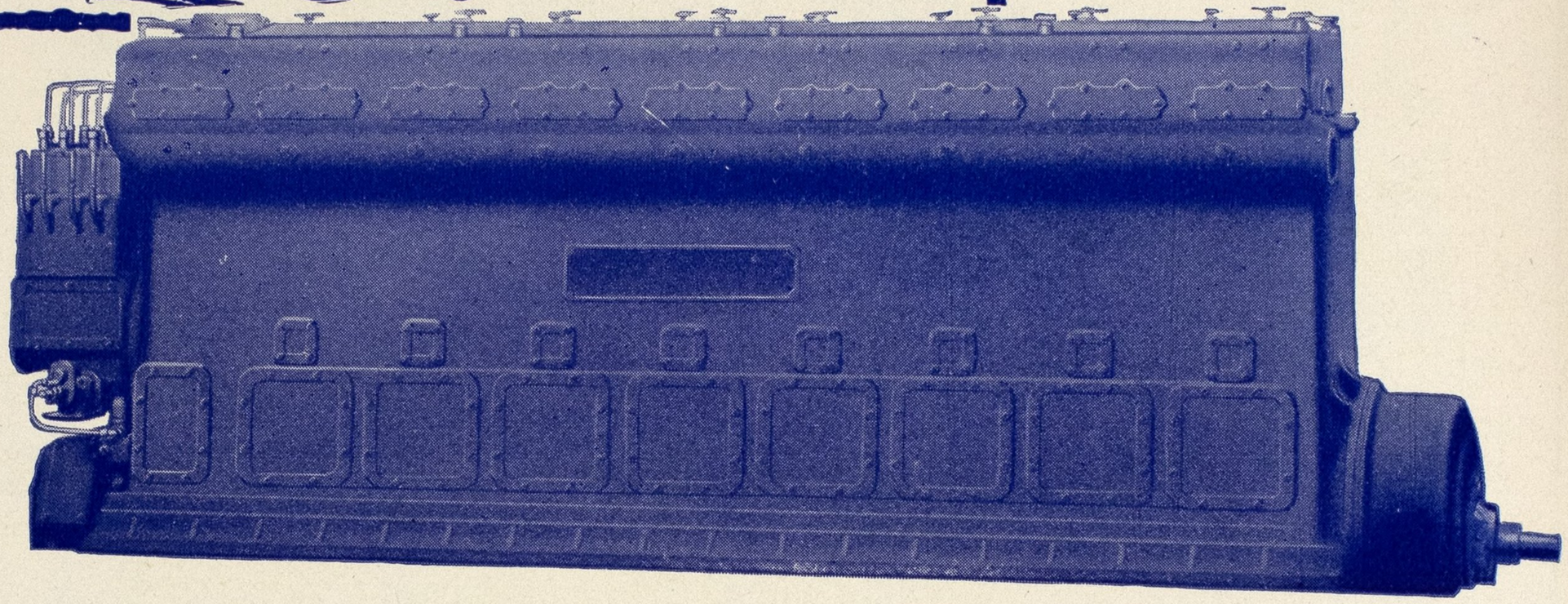
Among the new yachts for which A-E-CO steerers or deck auxiliaries were chosen are the *Migrant*, *Camargo*, *Narhoda*, *Aloha*, *Cambriona*, *Lotosland*, *Paragon*, *Rene*, *Wanderer*, *Perciana* and boats now building for Frank Goodyear, Edsel Ford, Charles T. Murphy, F. H. Rawson and Commodore Robert E. Todd.

CAPSTANS ***STEERERS*** ***WINDLASSES***
TOWING MACHINES ***STEERING WHEELS***
TELEMETERS ***GYPSIES*** ***WINCHES***

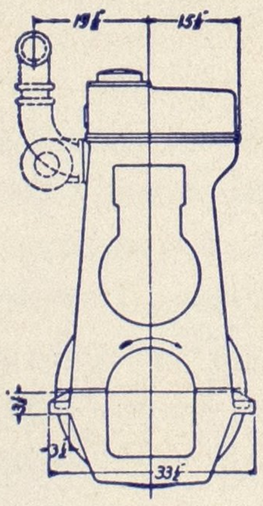
AMERICAN ENGINEERING COMPANY

2418 Aramingo Avenue **Philadelphia, Pa.**

8-Cylinder
Fulton-Marine-Diesel



. . . . a fulton-diesel engine designed and engineered for heavy duty marine service.



Cross-section diagram of the Fulton Marine Diesel

The FULTON-MARINE-DIESEL is the result of many years experience in designing and building heavy-duty stationary engines.

This new FULTON-DIESEL is designed especially for service in tow boats, tugs and trawlers where dependable, economical, constant service is essential. Conservatively rated at only 70 pounds M. EP. and 600 R. P. M. it will do heavy work at a moments notice and a strong, rigid frame gives it the stamina to stand up and deliver maximum efficiency as long as desired.

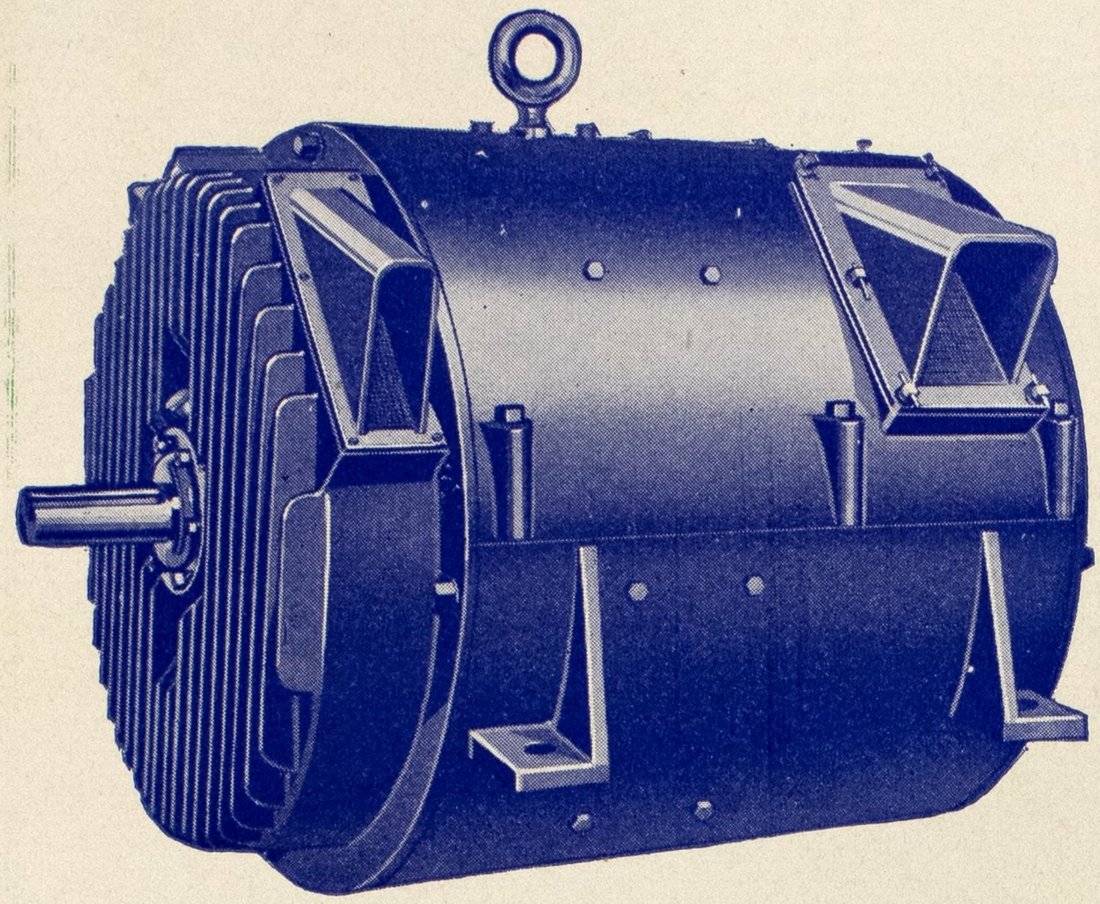
FULTON IRON WORKS CO., ST. LOUIS

Successful Engine Builders for over Seventy-five Years

PLANTS: St. Louis and Springfield, Ohio
BRANCH OFFICES AND AGENTS: New York ' Chicago ' New Orleans ' Springfield, Ohio ' Tulsa ' Dallas ' Houston ' Boston Pittsburg ' El Paso ' Mobile ' Salt Lake City ' Wichita, Kan. ' Havana

FULTON DIESEL

WITH DIESEL ENGINES



THE COMPACT DIEHL ELECTRIC GENERATOR

Economical

Dependable

Light and compact

Big overload capacity

FOR use on tugs, barges, lighters and similar craft of small tonnage equipped with Diesel engines, this unique electric generator is especially recommended.

Connected to the front end of the engine it provides economical source of electrical power, ample for all requirements, with minimum weight and space. Being set low in the boat, the lower half of the generator is watertight—completely protecting it against wash from the bilge. The ventilation openings in the upper half are provided with hoods to exclude water falling from above. Bearings are fully housed and are of the roller type, grease lubricated. The generator effects a real saving by charging the storage battery when not being used for power supply.

For economy, dependability and durability—install Diehl Diesel Engine Generators in your boats.

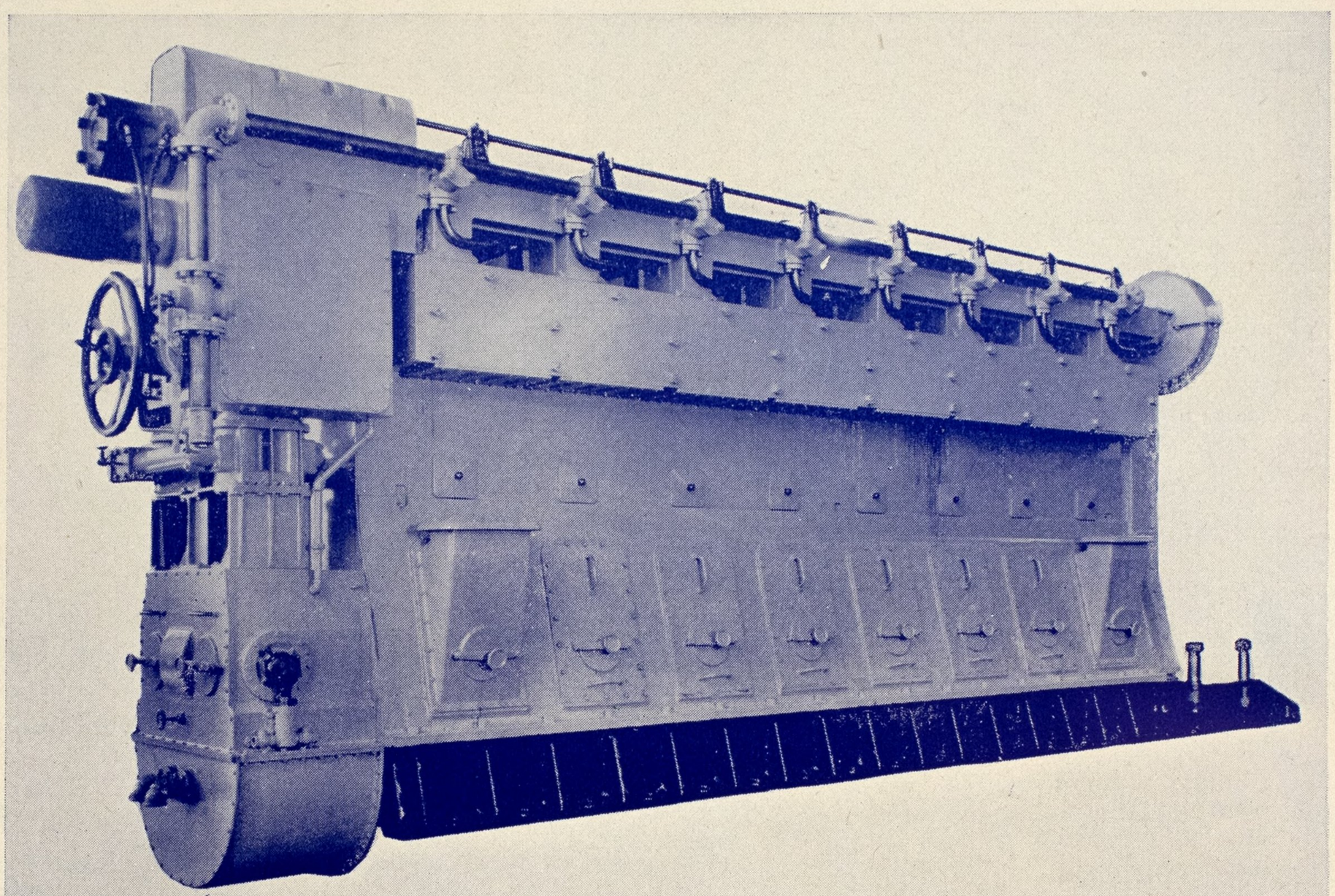
Diehl Manufacturing Company

Electrical Division of The Singer Manufacturing Company

Elizabethport, N. J.

New 8-Cylinder Winton-Diesel

Another Outstanding Achievement is this 1100 h. p. Airless Injection Marine

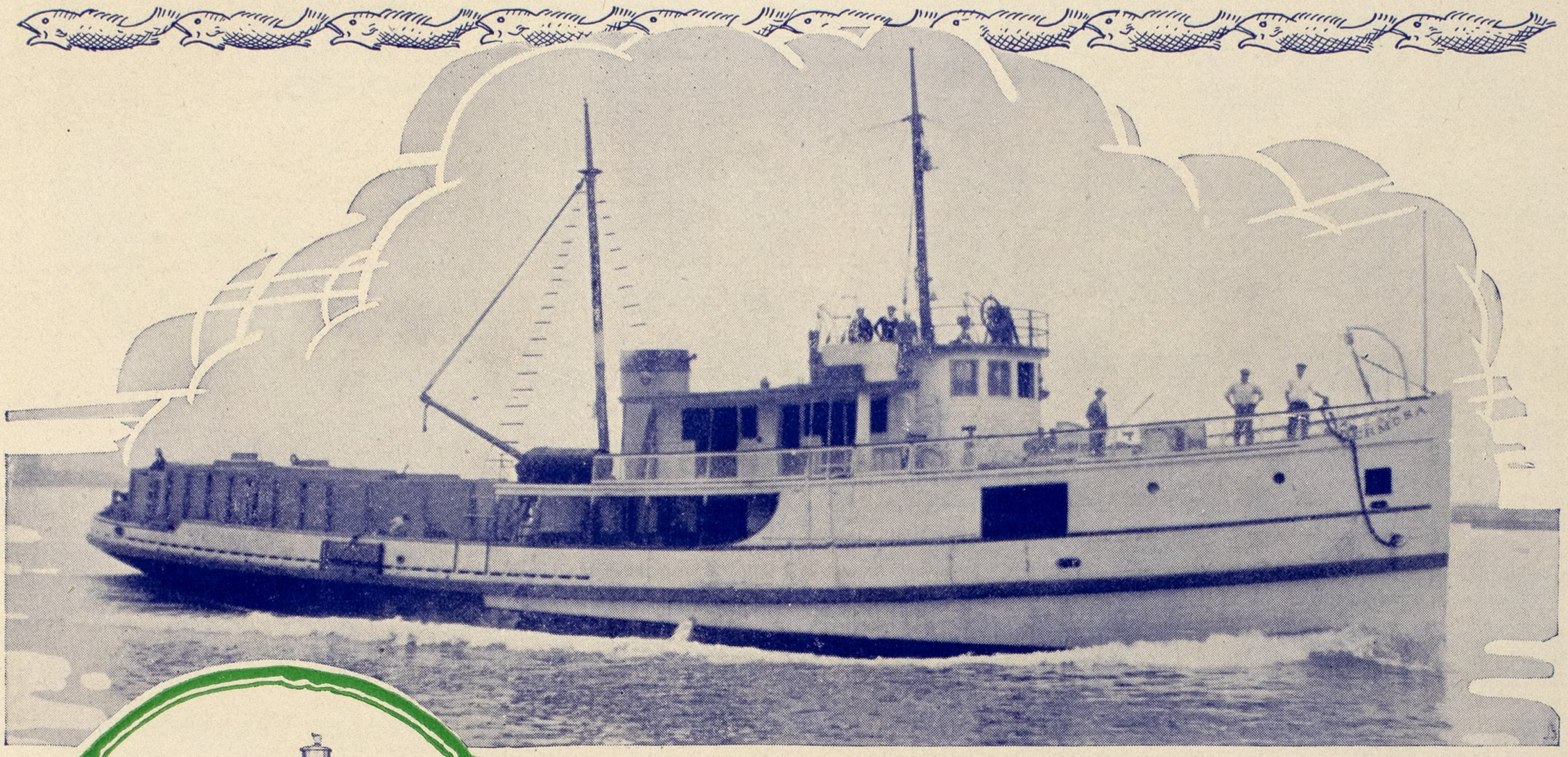


THIS New Winton-Diesel, Model 157, is an eight-cylinder, airless injection Diesel, with 16½" bore, 26" stroke, designed to develop 1100 H. P. at 250 R. P. M. Conservatively rated. Developed approximately 50% more power in official shop test than its rating calls for. Important, exclusive refinements in design. Control mechanism and pumps at forward end—control is exceptionally handy. Quieter, smoother, cleaner, more economical. A compact, rugged power plant. Weight, 135,000 lbs. In this new model, Winton again scores a distinct achievement—of interest to all workboat builders, owners and operators.

THE WINTON ENGINE COMPANY

CLEVELAND, OHIO, U. S. A.

DIESEL FISHING BOAT "HERMOSA" SHARPLES PROTECTED AGAINST DIRTY "LUBE" OIL



The "Hermosa"— 150-foot Diesel-powered tuna fish boat—is breaking all kinds of records on the west coast:

10,000 miles in 3 trips with no engine adjustments.

800 hours, on one run, without stopping.

6 cents a mile cost for fuel and "lube" oil.

Faultless and low-cost performance of the "Hermosa's" 560 h.p. Fairbanks-Morse Diesel is maintained by the clean oil protection afforded by a Sharples Super Centrifuge.

There is no substitute for the safe fuel and clean "lube" oil produced by a Sharples Oil Purifier.

THE SHARPLES SPECIALTY COMPANY, 2338 WESTMORELAND STREET, PHILADELPHIA. Boston, New York, Baltimore, Pittsburgh, Chicago, Detroit, Tulsa, New Orleans, San Francisco, Los Angeles, Toronto. Super Centrifugal Engineers, Ltd., Aldwych House, London, W. C. 2, England; Ste. Ame. Des Appareils Centrifuges, Rueil (Seine-et-Oise) 70, Rue Du Vieux—Pont, Paris, France; Tatsumi Commercial Corporation, Marine Insurance Building, Tokio, Japan.

SHARPLES
A GREAT FORCE

GULF

The following manufacturers have tested or examined **GULF DIESEL ENGINE OILS** *and have pronounced them satisfactory for the lubrication of their* **DIESEL ENGINES**

ALLIS-CHALMERS MANUFACTURING COMPANY

ANDERSON ENGINE & FOUNDRY COMPANY

ATLAS-IMPERIAL ENGINE CO.

The Bessemer Gas Engine Company

Bethlehem Steel Company

BOLINDERS

The Buckeye Machine Co.

BUSCH-SULZER BROS.-DIESEL ENGINE CO.

CHICAGO PNEUMATIC TOOL COMPANY

Colo-Diesel

CONTINENTAL GIN COMPANY

THE C. & G. COOPER COMPANY

DAVENPORT MANUEACTURING CO. INC.

DE LAVERGNE MACHINE CO.

Fairbanks, Morse & Co.

FOOS

FULTON IRON WORKS CO.

The Hooven, Owens, Rentschler Co.

HILL-DIESEL ENGINE COMPANY

Ingersoll-Rand Company

Kahlenberg

McINTOSH & SEYMOUR CORPORATION

MIANUS DIESEL AND GASOLINE ENGINES

Muncie Oil Engine Company

THE NEW LONDON SHIP & ENGINE COMPANY

NORDBERG

THE OTTO ENGINE WORKS

STANDARD MOTOR CONSTRUCTION CO.

PRIMM OIL ENGINES

The St. Marys Oil Engine Company

SUPERIOR GAS ENGINE COMPANY

SUN SHIPBUILDING & DRY DOCK CO.

TIPS ENGINE WORKS

UNION GAS ENGINE COMPANY

VENN-SEVERIN MACHINE CO.

WASHINGTON IRON WORKS

Wolverine Motor Works, Inc.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Gulf Refining Company

Pittsburgh, Pa., U. S. A.

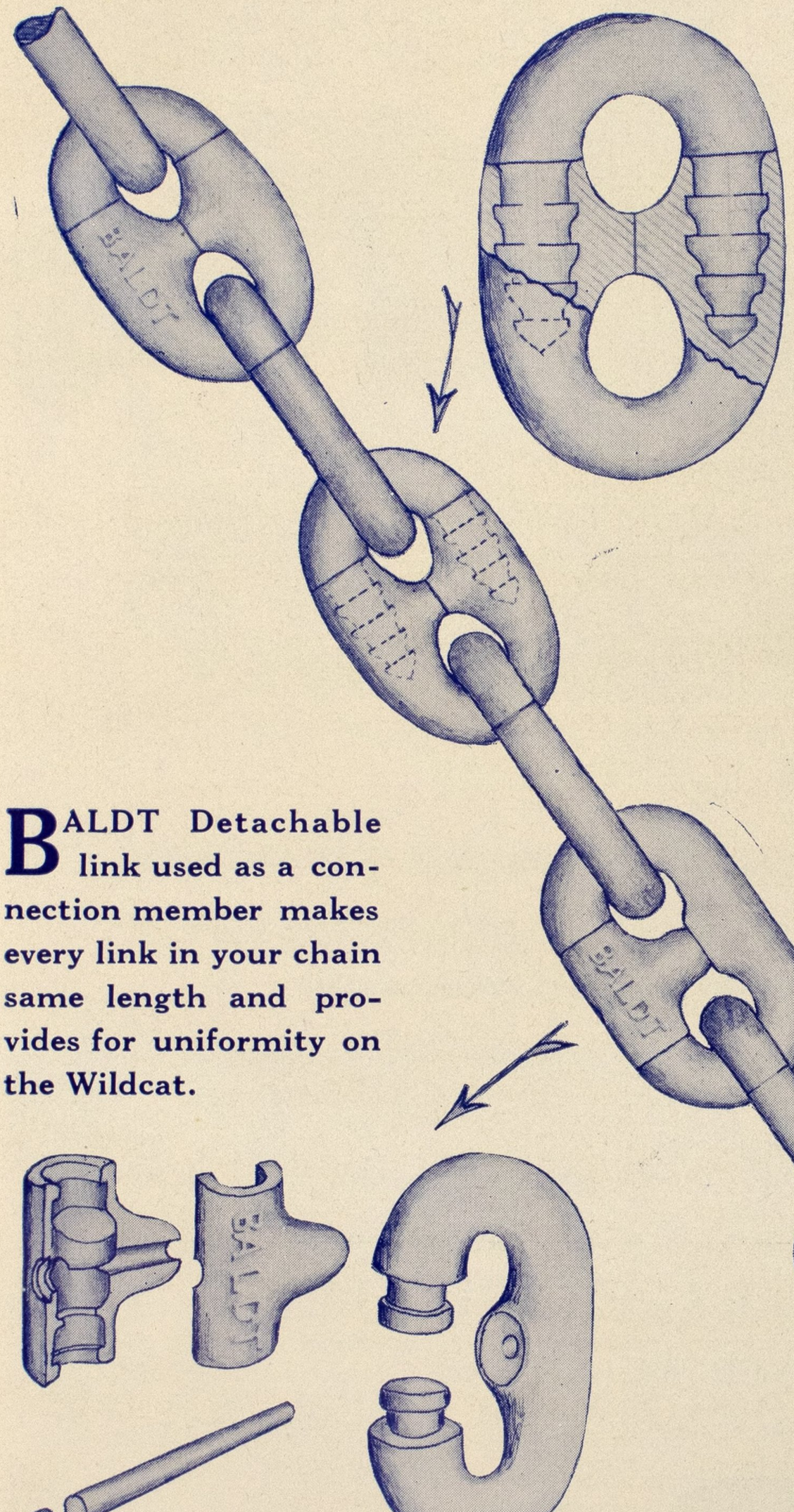
District Sales Offices: Boston, New York, Philadelphia, Atlanta, New Orleans, Houston, Louisville

Refineries: Bayonne, N. J., Philadelphia, Pa., Port Arthur, Tex.

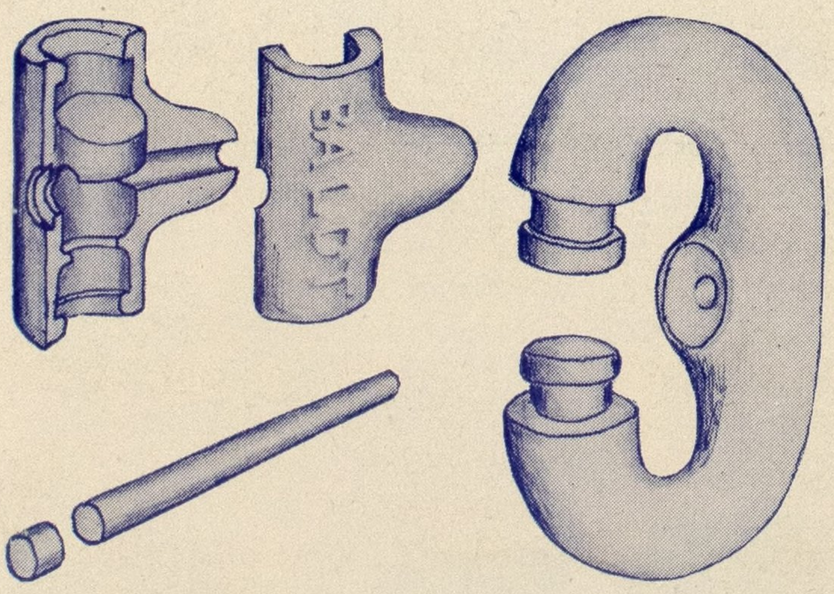
Announcing

Another Baldt Product — — — —

DI-LOK CHAIN



BALDT Detachable link used as a connection member makes every link in your chain same length and provides for uniformity on the Wildcat.



Guaranteed 50% stronger than Cast Steel and 100% stronger than Wrought Iron Chain.

A male and female member drop forged from alloy steel and locked together by means of heating female and locking extra metal of female around lugs of male.

This forms a chain uniform in size of every link and the stud is an integral part of same.

The lock is stronger than the shearing strength of the end of the link and failure will occur by shearing out the end.

3½% nickel steel is used which is a ductile fibrous metal. By using this grade of material to S.A.E. Specifications, we are not able only to offer a chain uniform in size and stronger but we guarantee a uniform breaking point, not a high and a low break, but a uniform break and 50% more than required.

In testing 1¼" Di-Lok Chain, sixteen tests were selected. The low break was 224,000 lbs., the high break, 236,000 lbs. The required break was 129,000 lbs.

In testing 2½" Di-Lok Chain, 20 tests were selected. The low break was 840,000 lbs., the high break was 900,000 lbs., the required break for Cast Steel of this size is 492,000 lbs.

A chain is no stronger than its weakest link.

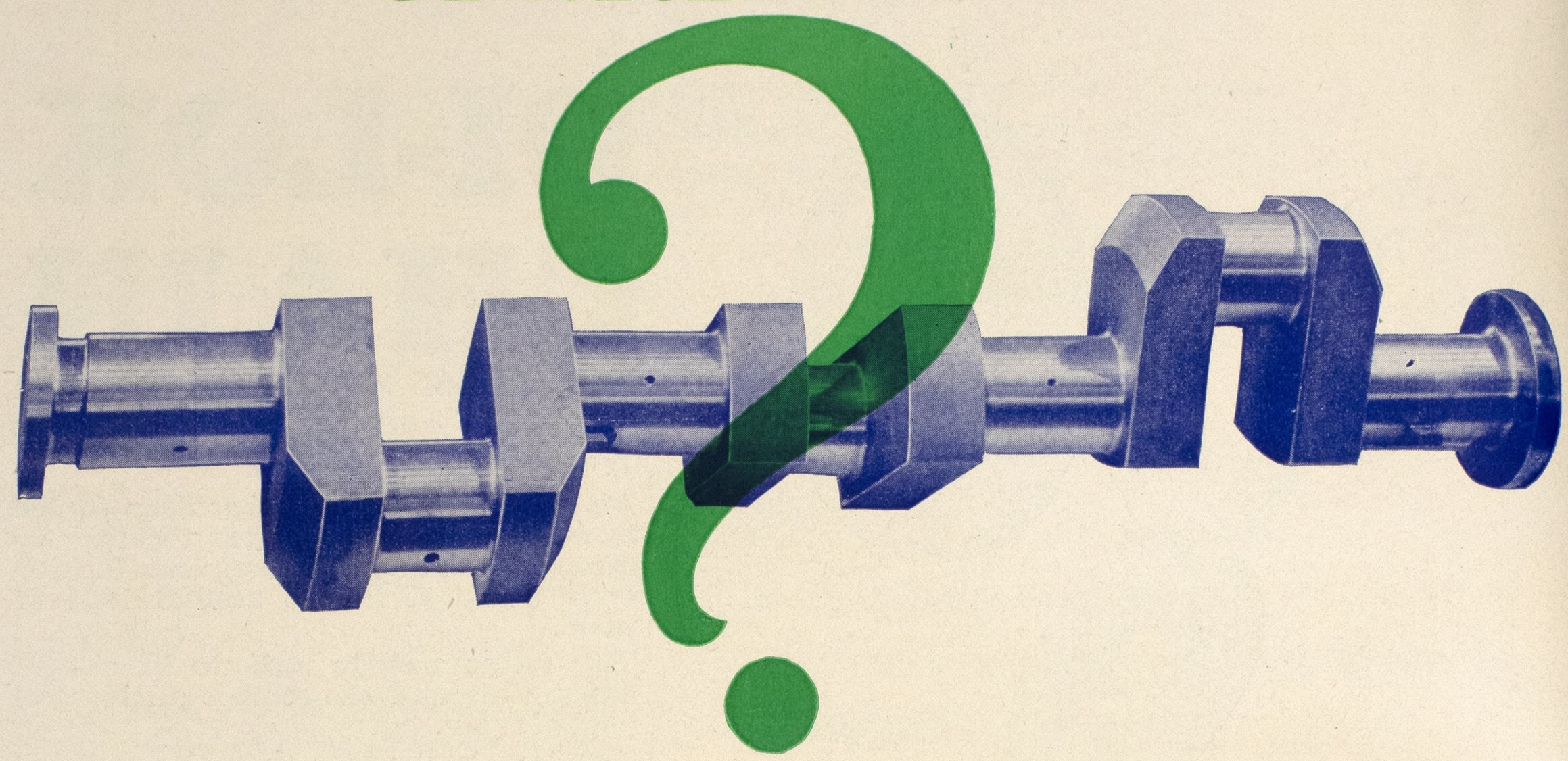
Protect your ships with chain of a uniform breaking strain.

Baldt Anchor Chain & Forge Corp.

Chester, Pa.

Manufacturers of *THE ORIGINAL STOCKLESS ANCHOR*

What "Tifoco" Means in a Crankshaft



It Means—

THAT every Ingot or billet is selected from the cream of the mill and cold sawn before forging—this to permit inspection for hidden flaws.

THAT reduction is carefully watched and a 30% crop from the top and 5% crop from the bottom is religiously adhered to, regardless of increased production costs.

THAT no **Tifoco** shaft is forged under a steam hammer. Hydraulic presses are used exclusively.

THAT there is always a liberal margin over customers' specifications.

THAT every finished crankshaft is ground on the shafts and the pins turned with a Weber patented tool and polished.

THAT all pins are absolutely parallel with the journals, within a tolerance of 0.001½" unless specified closer.

THAT all marine shafts are forged to American Bureau and Lloyds requirements.

THAT if you quote **Tifoco** in your Diesel engine specifications you will have the finest crankshaft it is possible to obtain.

We also specialize in making intricate pistons, either rough or finished machined.

TITUSVILLE FORGE COMPANY

Sales Offices
Pittsburgh, Pa.
Buffalo, N. Y.
Detroit, Mich.

TITUSVILLE, PA.

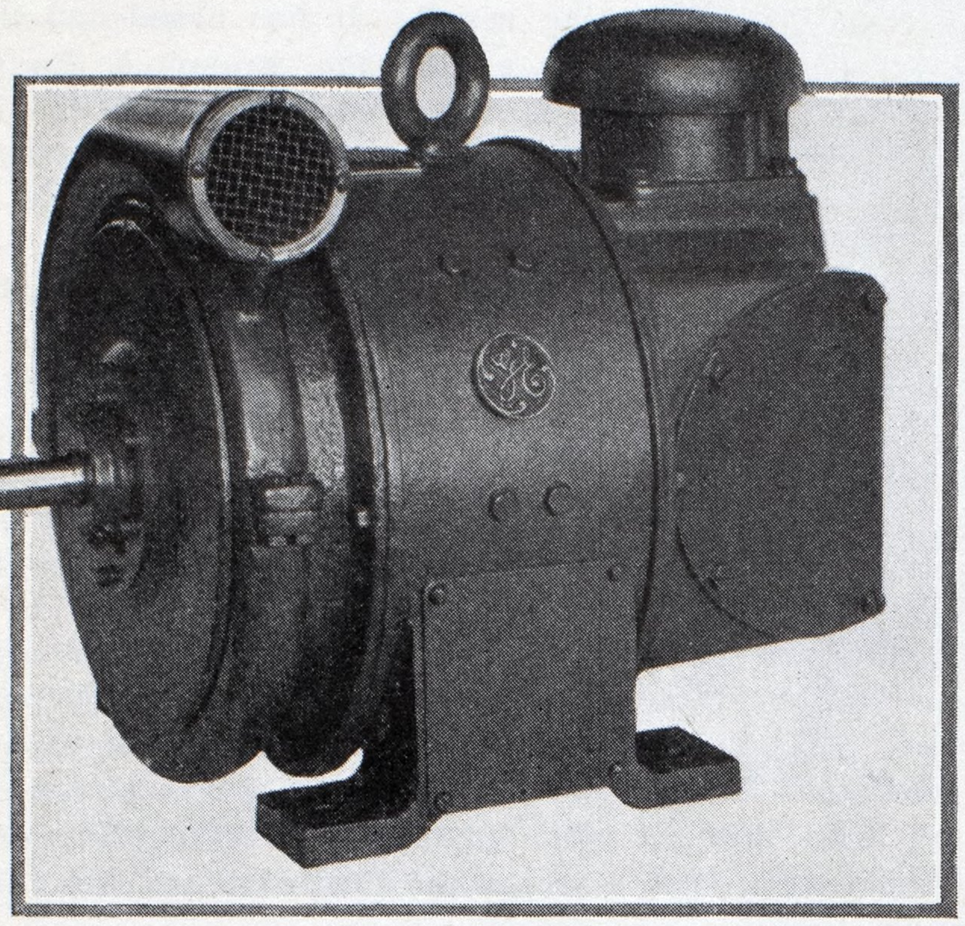
Milwaukee, Wisc.

Sales Offices
New York City
Chicago, Ill.
Cleveland, Ohio

40 Pounds **TIFOCO** **to 40 Tons**

The Sterling Mark of a Good Crankshaft

Electrical Equipment for Marine Use



Enclosed self-ventilated motor with protecting covers of cast iron

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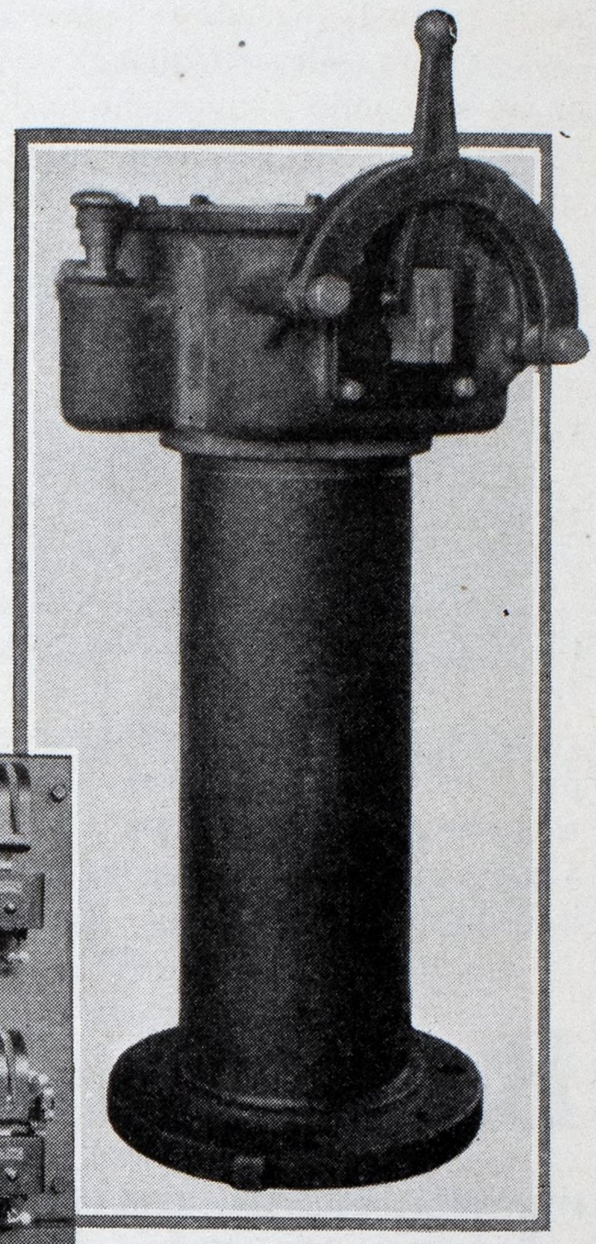
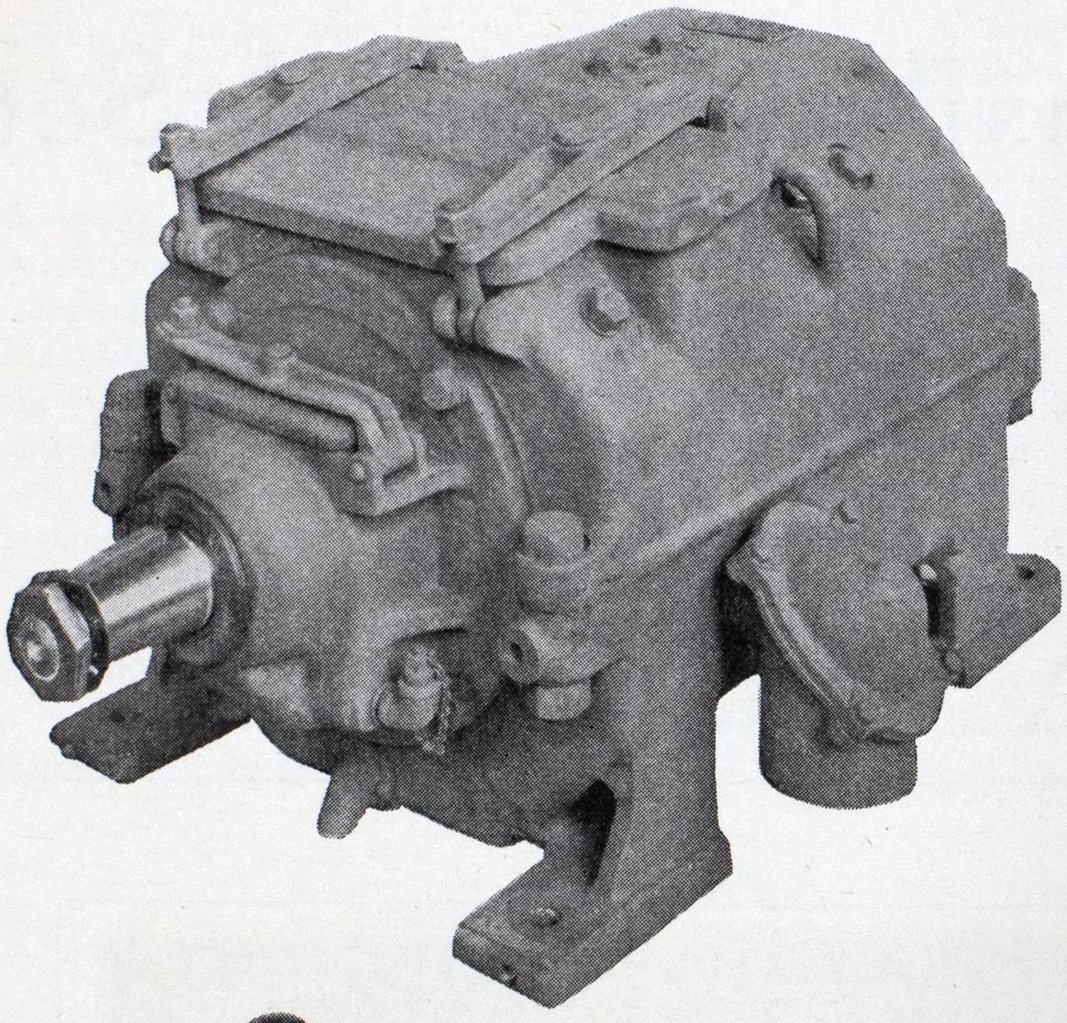
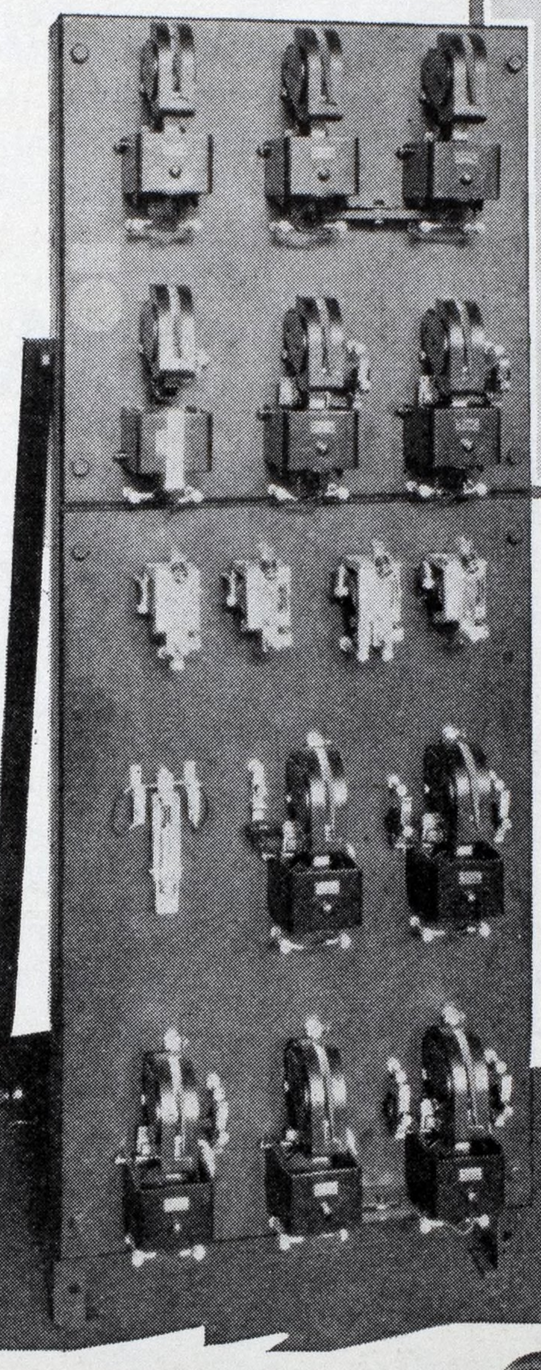
Below, Left — Motors for above deck service are rugged and waterproof

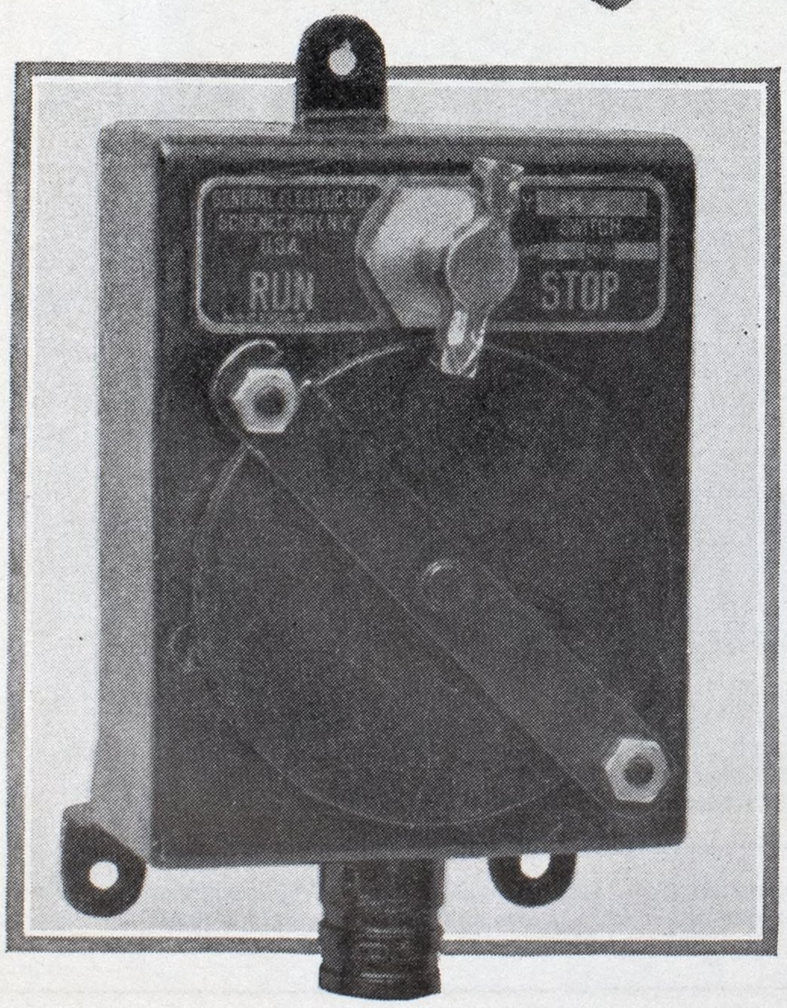






Above—Master switch for control of cargo winches

An automatic control panel, for cargo winch, that eliminates the "guess"



A totally enclosed fan cooled motor. The interior of this motor is sealed against outside air

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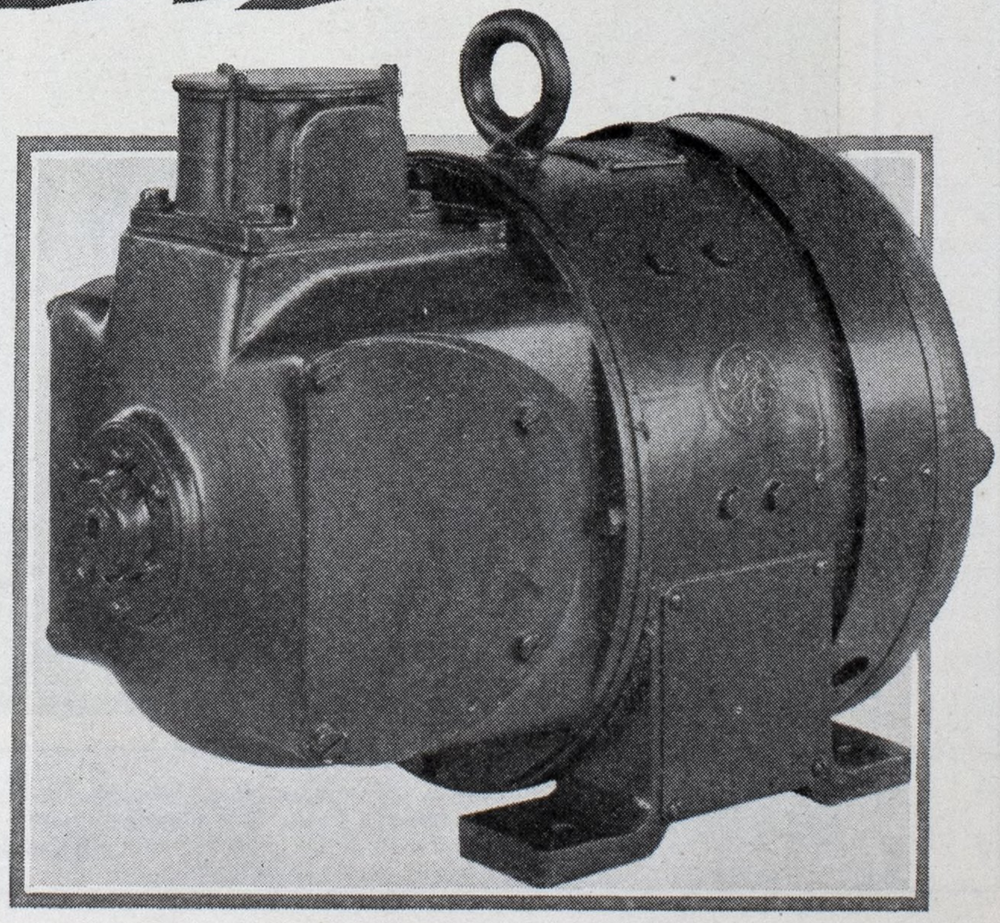
The Master Switch which starts a sequence of properly timed operations



Built-

at Newport News

SINCE the inception nearly one half a century ago of the Newport News Shipbuilding and Dry Dock Company, one unaltering ideal has guided its efforts. This ideal has ever been to build good ships for every service; ships that possess those qualities which can only come from the hearts as well as the minds of designers and the hands of craftsmen, tuned to the work through love and understanding of all that a ship should be.

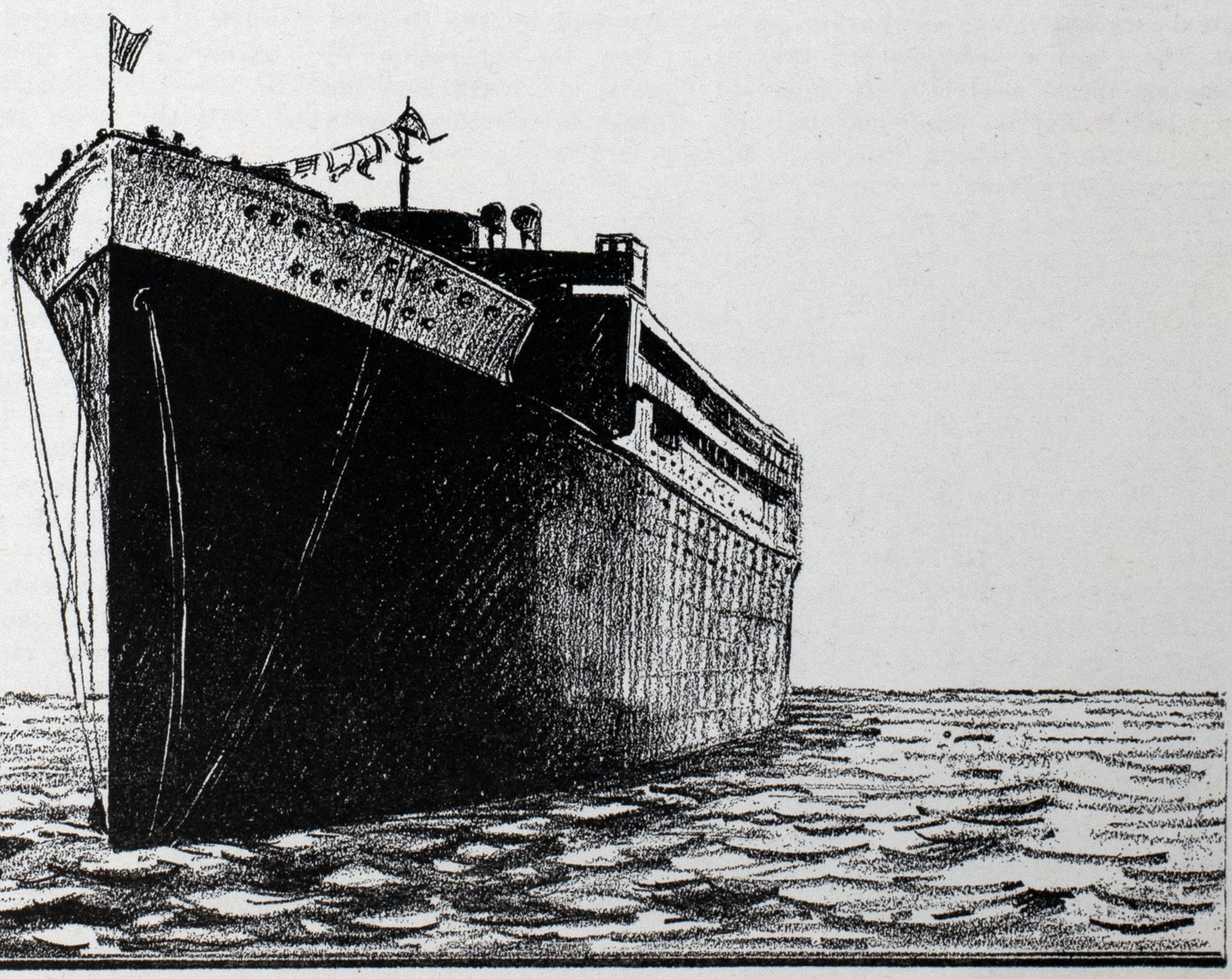
BUILT AT NEWPORT NEWS is more than a phrase, it is a symbol of genuine character and a guarantee of a production of exceptional quality.

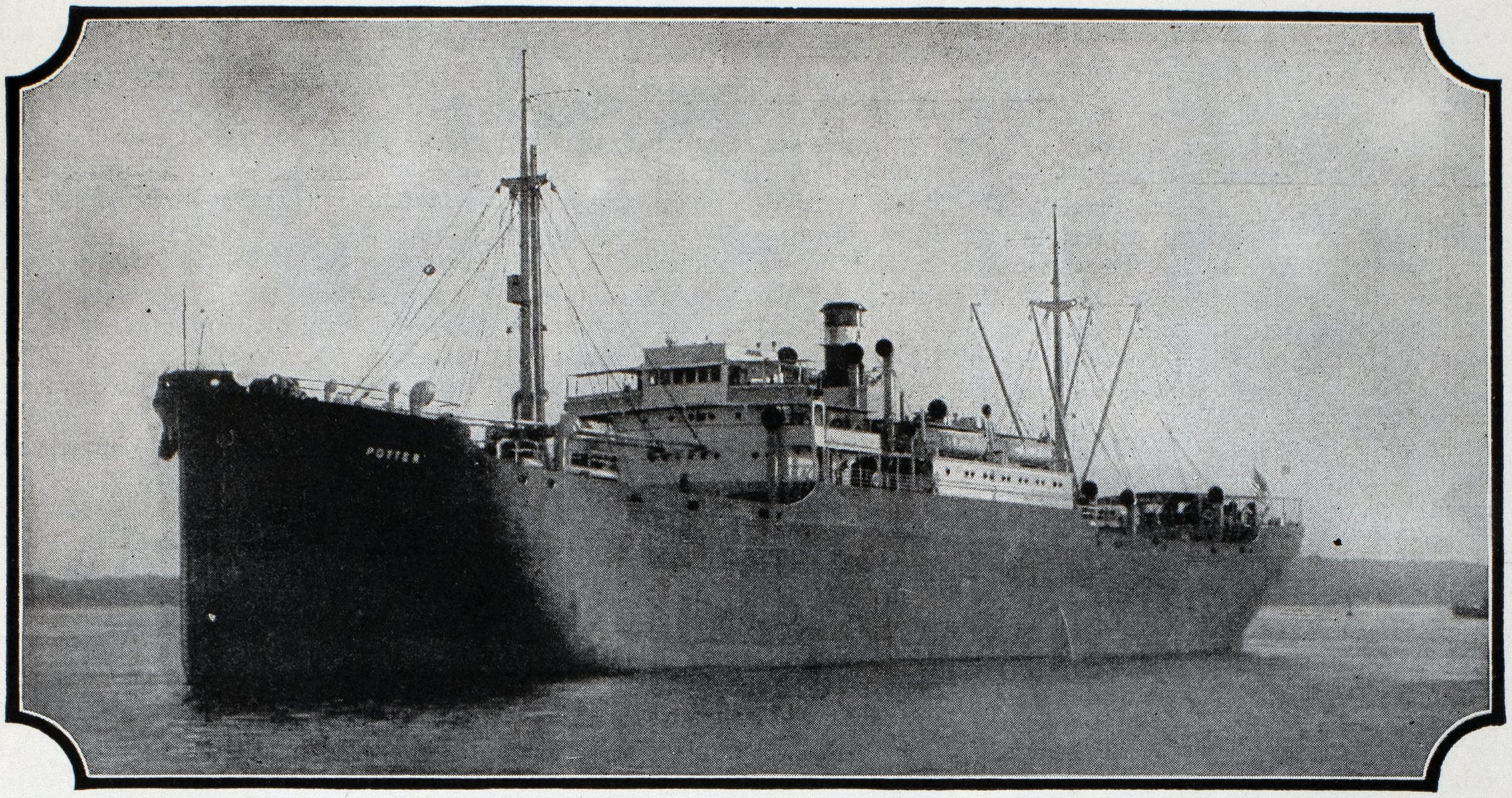
No yard in America offers a more complete service. The vast resources, unlimited facilities, large capacity, scientific scheduling system, highly efficient designing and producing organization perfectly coordinated and the splendid co-operation with the client insure—

SHIPS OF CHARACTER

Newport News Shipbuilding and Dry Dock Company

Newport News, Va. 233 Broadway, New York City





Operated by the Roosevelt Line
LUBRICATED *by* TEXACO

ANOTHER Diesel driven ship goes into service joining the fleet of Texaco lubricated vessels carrying passengers and freight to the ports of the world.

The converted Motor Ship Potter, fresh from a successful trial trip, will be operated by the Roosevelt Line between New York and the Far East. It is a vessel of 6,204 gross tons and is powered by a double-acting, two-cycle, four-cylinder Worthington Diesel Engine of 3,625 B. H. P.

Texaco Lubricants contributed to the success of the trial and will be continued to be used for Diesel lubrication aboard this vessel.

Texaco Lubricants are known the world over for their exceptional performance in this exacting service, and the fact that they are obtainable at all the principal ports, and always of the same uniform high quality, gives them an especially high standing in marine circles everywhere. There is a Texaco Lubricant for every purpose. Write The Texas Company first. Texaco engineers, authorities on lubrication principles and practices, are always ready to cooperate for effective lubrication.

The Texas Company, 17 Battery Place, New York City

Texaco Petroleum Products

MARINE SALES DIVISION

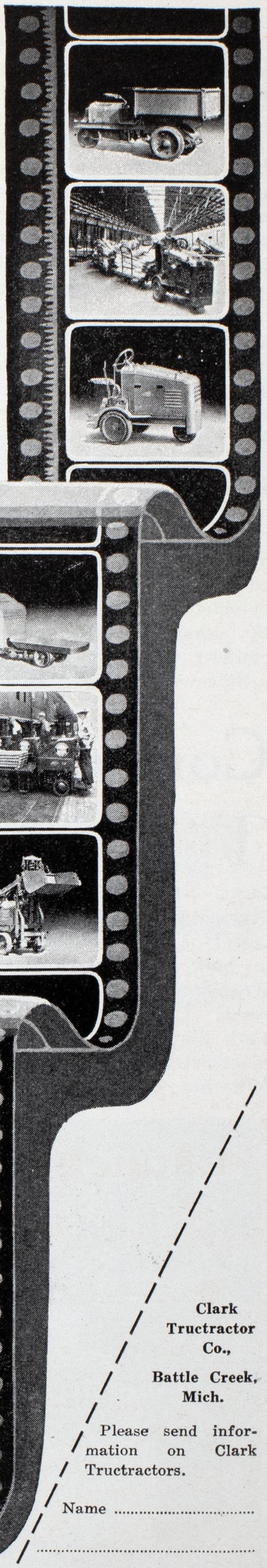
TEXACO

REG. U.S. PAT. OFF.

A Talking Moving Picture

Which translated from the language of the "talkies" means:—

Clark Tructractors are gasoline powered, competent for 24 hours' continuous service, and just as potent in the last hour as the first. Moving materials with this equipment is Talking in terms of Low Costs and Greater Profit.



CLARK TRUCTRACTORS

Reg. U. S. Pat. Office

Clark Tructractor Co.,

Battle Creek, Mich.

Please send information on Clark Tructractors.

Name .....

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Company .....

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Address .....

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ARE BUILT JUST RIGHT

FOR THE EXTREMELY SEVERE SERVICE

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and

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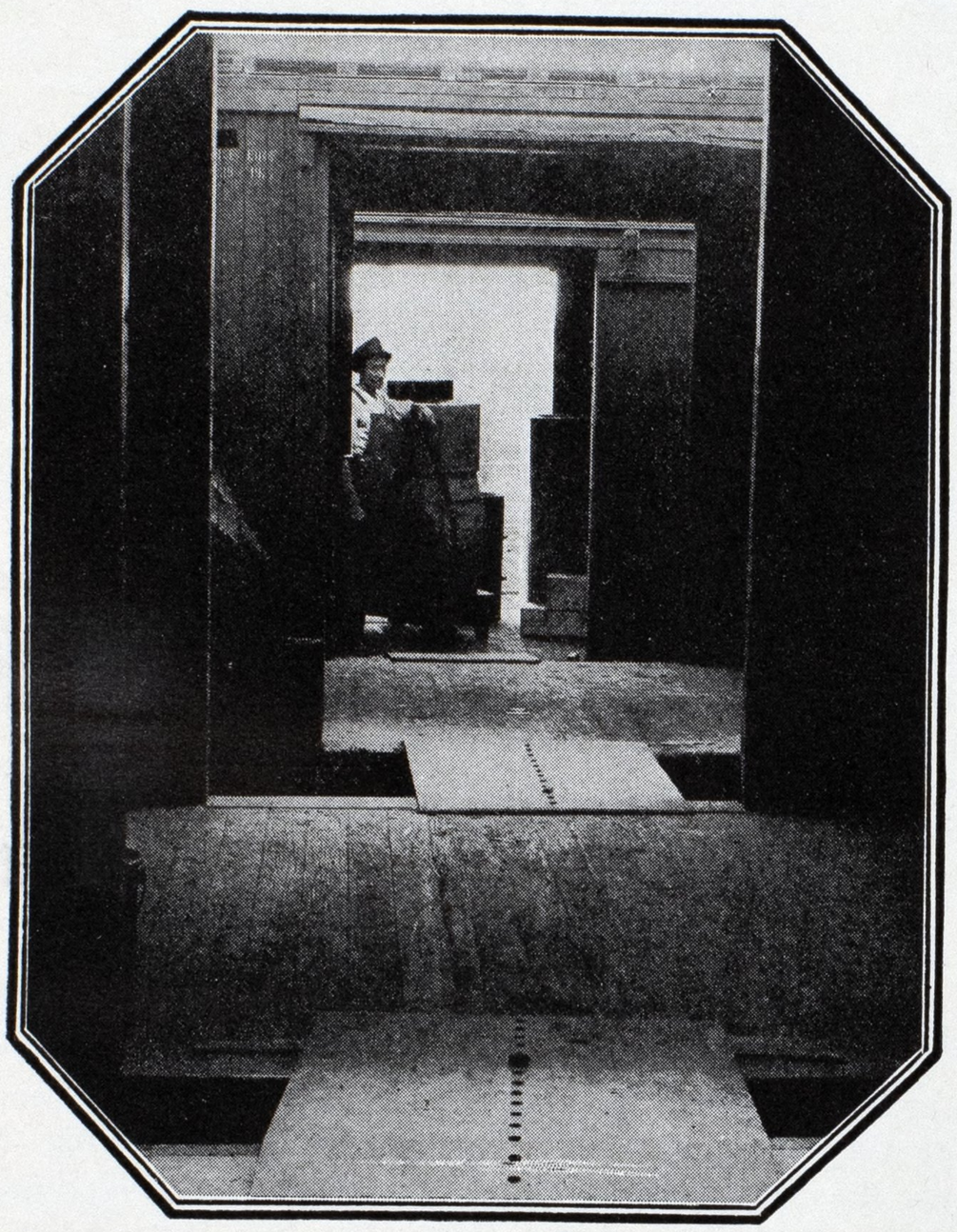
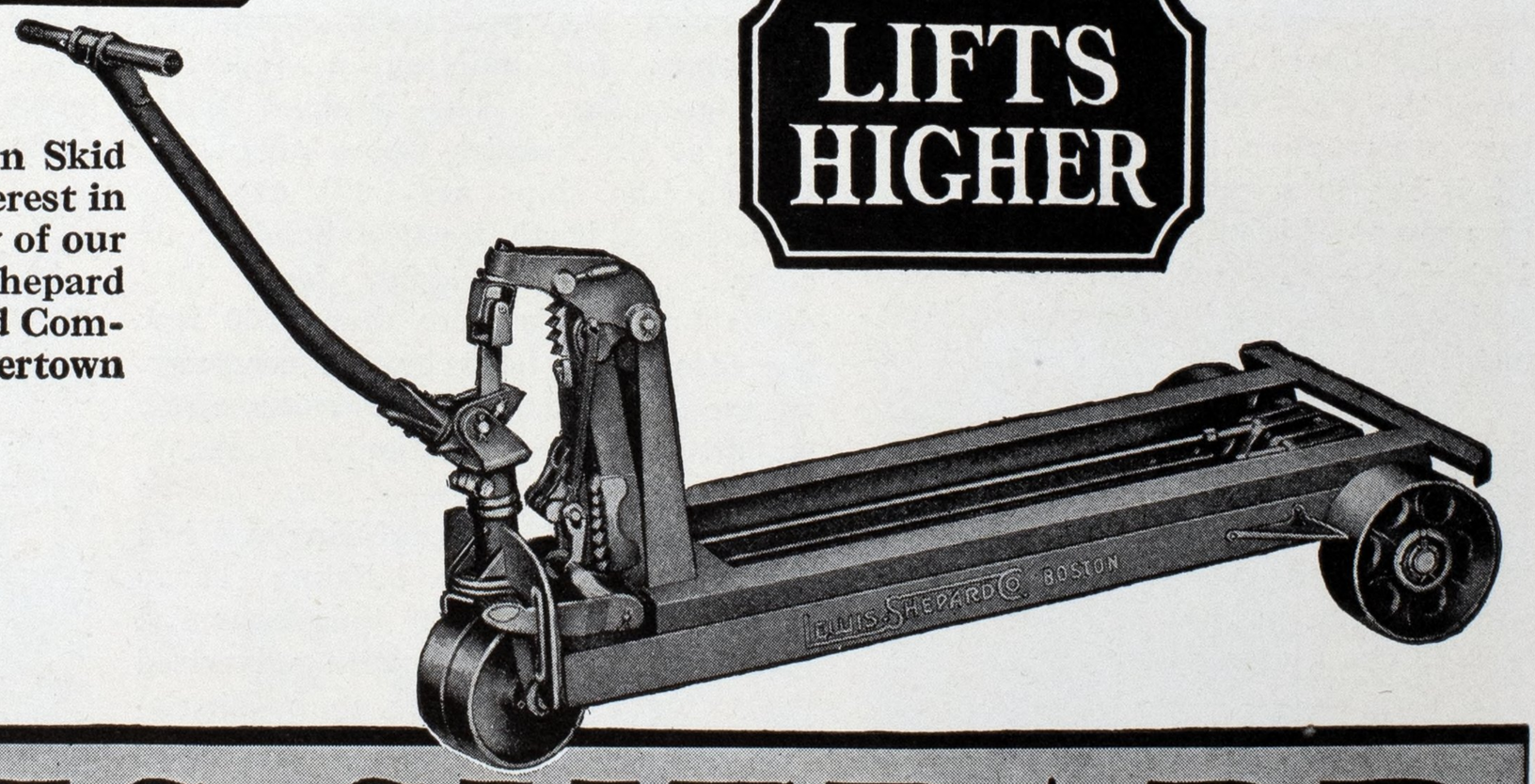
at Marine and Railway Shipping Terminals





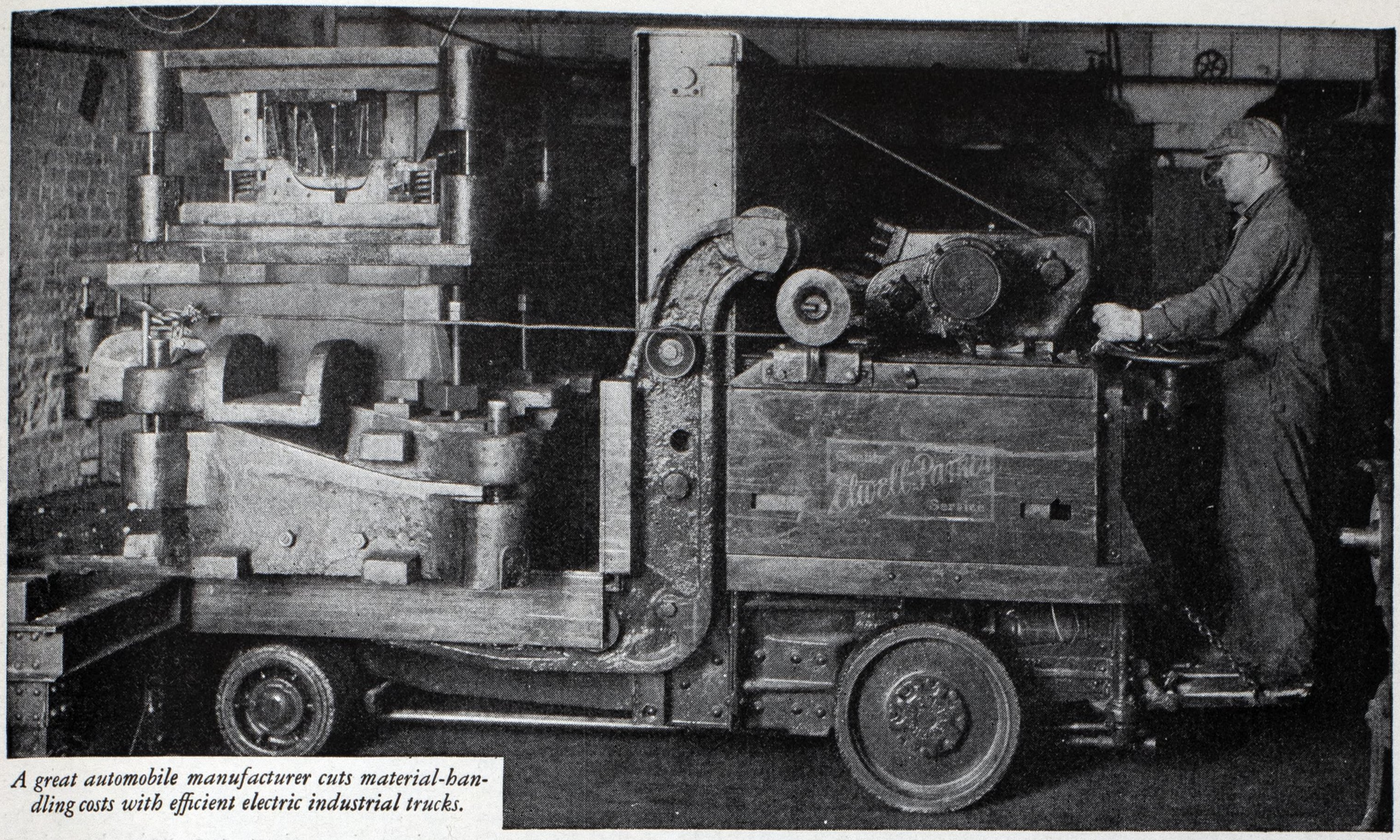
LIFTS HIGHER

Let us send you "Ship on Skid Platforms," a circular of interest in Shipping circles, and a copy of our revised catalog, "Lewis-Shepard Engineering," Lewis-Shepard Company, 170 Walnut Street, Watertown Station, Boston, Mass.

THE MAGIC CARPET OF INDUSTRY

LEWIS-SHEPARD

Many Large Manufacturers are Shipping their Goods on Lewis-Shepard Skid Platforms



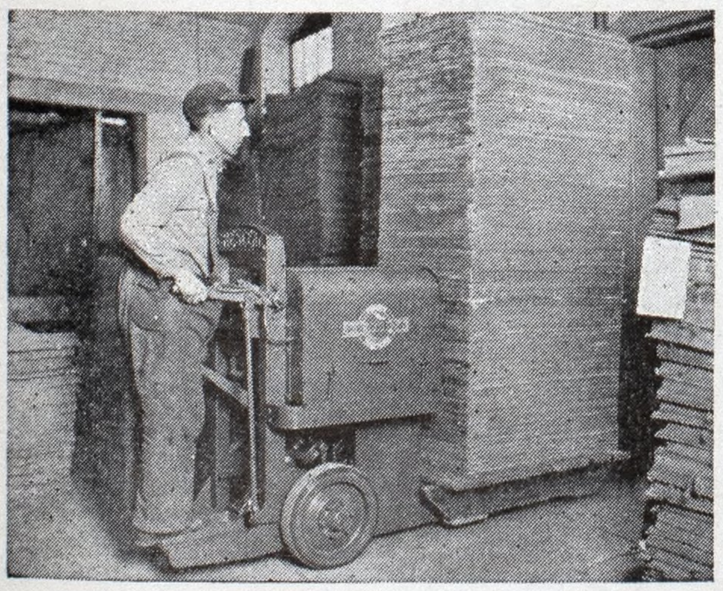
A great automobile manufacturer cuts material-handling costs with efficient electric industrial trucks.

SAVE MONEY *through process and assembly with* INDUSTRIAL TRUCKS

Electric trucks and tractors speed production . . . cut handling costs

CONSIDER your material-handling costs. You can reduce them substantially . . . as many other manufacturers have done . . . with fast-moving, efficient electric industrial trucks.

These strong little giants can save money for you in many ways. They speed production. They release from two to ten men for other more profitable work. They reduce storage, space and inventories. They cut the idle hours of machinery. One Pennsylvania automobile body building concern estimates a net earning capacity of $112.00 a day for a single high lift truck used for lifting heavy dies.



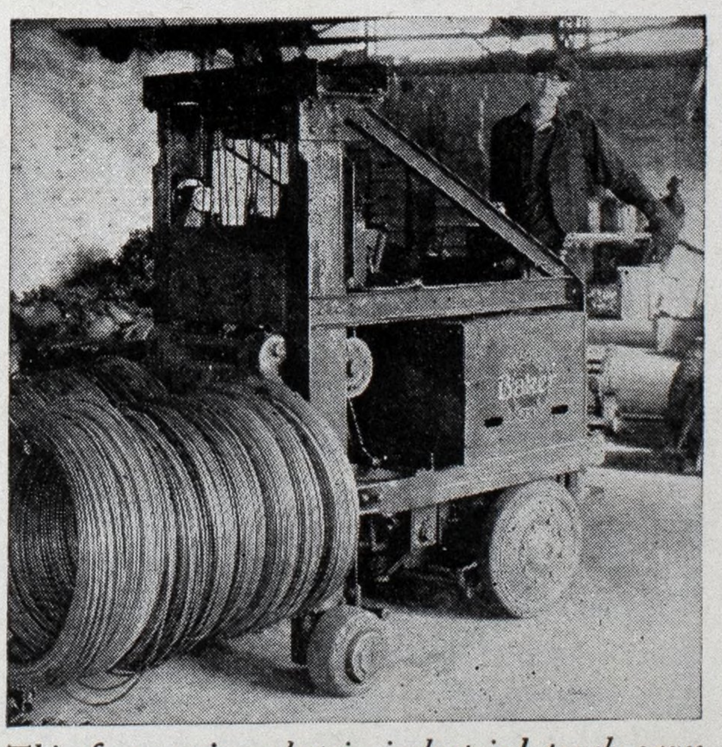
Sturdy . . . powerful . . . fast . . . electric industrial trucks handle material faster and cheaper.

Efficiency of truck depends on battery

To perform its many hard jobs the industrial truck must have an adequate power source. Hundreds of manufacturers have standardized on Exide-Ironclad Batteries for gruelling truck service, because Exides are built for long, trouble-free, economical lives.

Forty-one years' experience in building batteries for every purpose stand behind the Exide-Ironclad. Exide engineers have specially designed this rugged battery to do its job dependably. Write for full information.

Exide
IRONCLAD
BATTERIES



This fast-moving electric industrial truck saves money for a prominent spring manufacturer.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Why more than

1300

American vessels rely upon

RCA

RADIOMARINE EQUIPMENT AND SERVICE

American shipping officials recognize that the service of the Radiomarine Corporation of America is unsurpassed for efficiency of detail and unequalled for diversification, completeness and all-around excellence.

This service includes the prompt, efficient handling of radio traffic through 15 Radiomarine coastal stations on the Atlantic, Pacific, Gulf and Great Lakes . . . reception of accurate and detailed weather reports . . . correct time signals . . . radio compass bearings and direction finder service . . . equipment inspections at any of the 17 important ports . . . maintenance of conveniently located stocks of spare parts for repairs and renewals . . . the auditing and settling of accounts . . . securing of ship station licenses and the detailing of experienced operating personnel to ships. Truly a service unrivaled in scope and unmatched in efficiency! Is it any wonder that the American Merchant Marine turns to RCA Radiomarine service?

◆ ◆ ◆

Radiomarine coastal stations are located at the following points:

Chatham, Mass. . . . . New London, Conn.
East Moriches, L. I. . . . . New York, N. Y.
Tuckerton, N. J. . Baltimore, Md. (city station)
Palm Beach, Fla. . . . . Galveston, Tex.
Port Arthur, Tex. . . . . Buffalo, N. Y.
Cleveland, Ohio . . . . . Chicago, Ill.
Duluth, Minn. . . . . Los Angeles, Cal.
San Francisco, Cal.

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Radiomarine storerooms and service stations in charge of radio men of long experience are located at the following ports:

Boston . New York . Philadelphia
Baltimore . Norfolk . Savannah
New Orleans . Galveston . Port Arthur
Buffalo . Cleveland . Chicago
Duluth . Los Angeles . San Francisco
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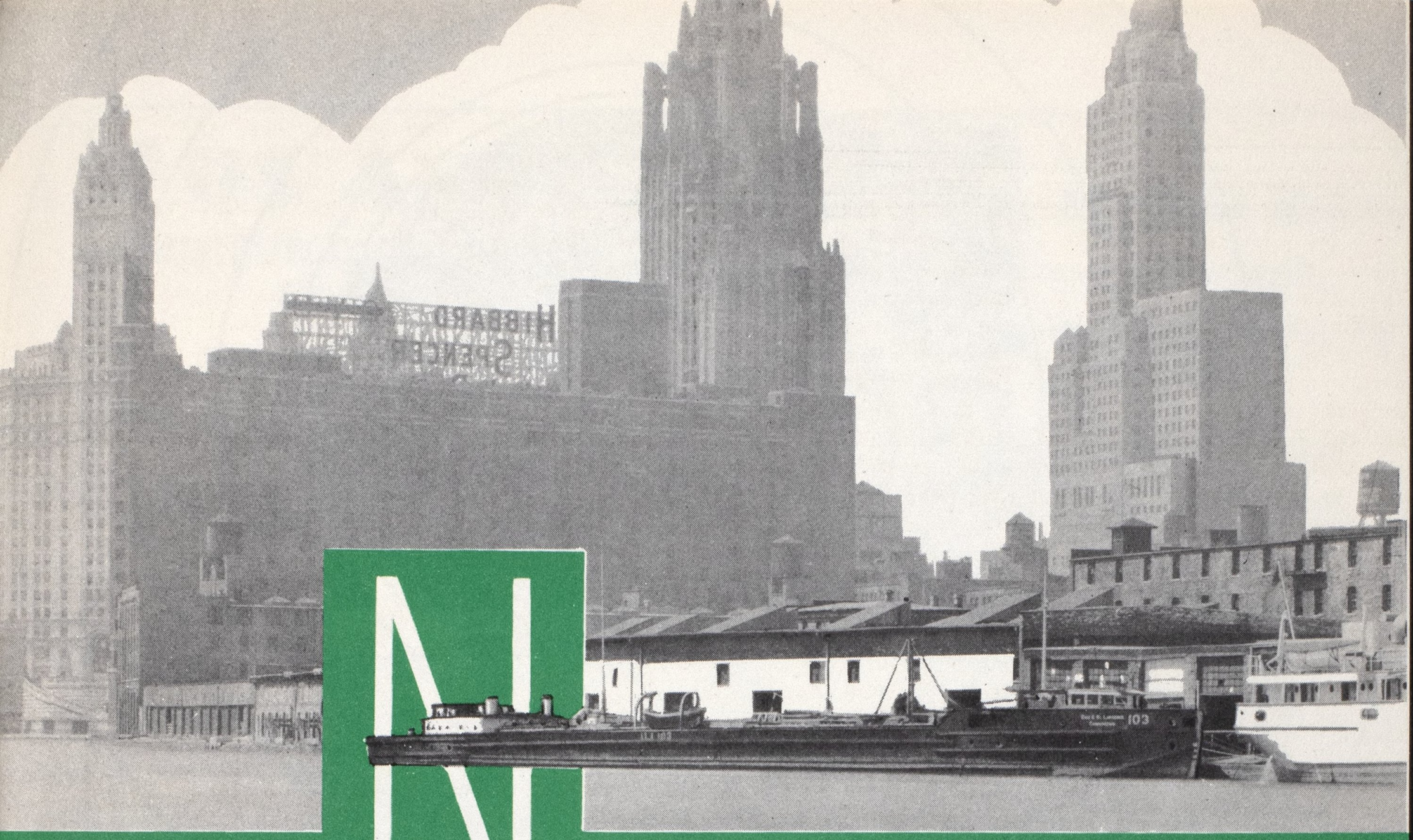
RADIOMARINE CORPORATION
OF AMERICA
66 BROAD STREET
NEW YORK



New opportunities for shipping interests . . .

When the Motorship "I. L. I. 103" docked at Chicago with 1500 tons of cargo from Philadelphia, new opportunities became proved facts to shipping interests.

Cargoes by inland waterways can be profitable to both shipper and carrier!

The "I. L. I. 103" is one of a fleet operated by the Erie and St. Lawrence Corporation and is typical, in both hull and engine room, of the combination of characteristics which enable her to operate profitably over the seaboard-canal-lakes route. Built as she is to go under canal bridges, there is not the superstructure of the usual open water craft. The vessel consequently handles well with little roll or pitch in the open sea despite her comparatively shallow draft.

She is driven by two 180 hp. Fairbanks-Morse Diesel Engines, and due to the compactness of oil as compared to other fuels, a great gain is made in the amount of hull space available for paying cargo. For the same reason, cruising range is materially lengthened.

The extreme economy of Fairbanks-Morse Diesel operation also permits profitable operation at rates low enough to be an inducement to shippers.

Diesel economies are bringing new opportunities to vessel owners and operators on all waters. Dieselizing of existing vessels is a big factor in shipping progress.

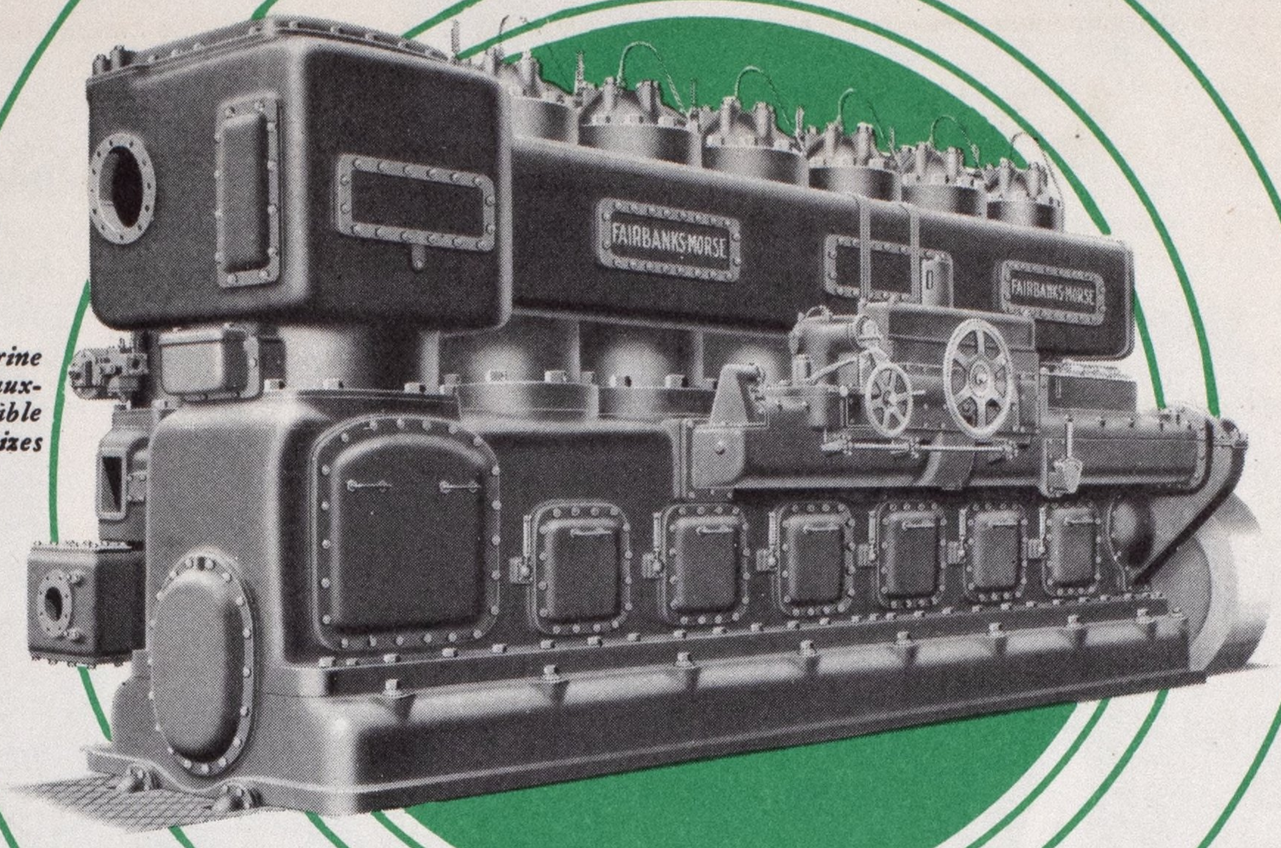
Fairbanks-Morse as the largest American manufacturer of Diesel engines has both the engines and service facilities which make a Fairbanks-Morse Diesel the logical choice for marine service.

FAIRBANKS-MORSE DIESEL ENGINES

POWER, PUMPING AND WEIGHING EQUIPMENT

FAIRBANKS-MORSE DIESEL ENGINES

FAIRBANKS-MORSE DIESEL ENGINES



An 840 hp. F-M Marine Diesel with built-in auxiliaries. Also available in 700 and 560 hp. sizes

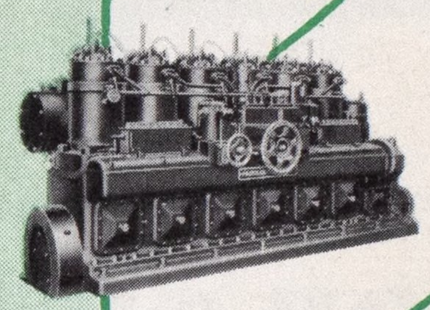
UNIQUE

NIQUE in the field of marine power equipment is Fairbanks-Morse service. A complete line of Diesel engines in many sizes from 25 hp. to 840 hp. meets the power requirements of most types of craft and makes available the economies of these engines for both the main drive and auxiliaries. Many marine builders and owners are taking advantage of unified responsibility and equipping their vessels with F-M Diesels, Motors, Generators and Pumps—all made in Fairbanks-Morse plants. Thus a single source of supply becomes responsible for efficient performance from the propeller shaft drive to electric lights, pumps and motor operated auxiliaries.

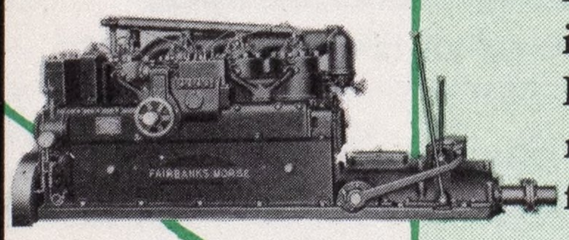
In the conversion of existing vessels or the building of new ones, F-M engineers are frequently called into consultation regarding power requirements.

The advantages of full Fairbanks-Morse equipment are further enhanced by service facilities in principle ports of the world—seldom is a Fairbanks-Morse equipped vessel beyond the reach of F-M service. Fairbanks-Morse service facilities are unsurpassed by those of any other American manufacturer of Diesel engines.

FAIRBANKS, MORSE & CO., Chicago
Branches with Service Stations in Principal Ports

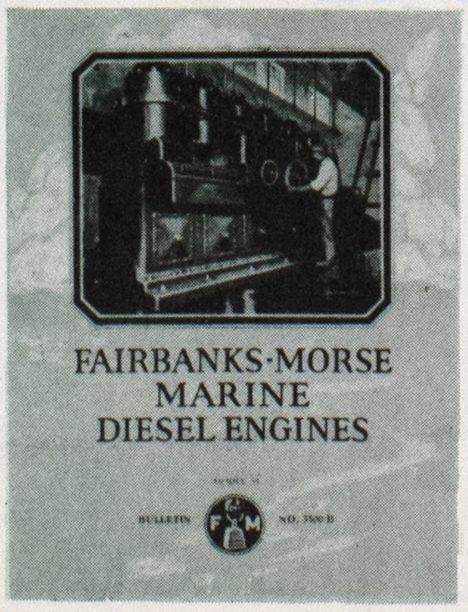


A 240 hp. F-M Diesel built also in 3 to 6 cylinder types ranging from 75 to 360 hp.



A cast-in-block F-M Diesel, ideal for tenders, small workboats, auxiliaries, etc. In 2 to 6 cylinder sizes—25 to 70 hp. Auxiliary units consisting of engine, air compressor and generator are also available

FAIRBANKS-MORSE DIESEL ENGINES



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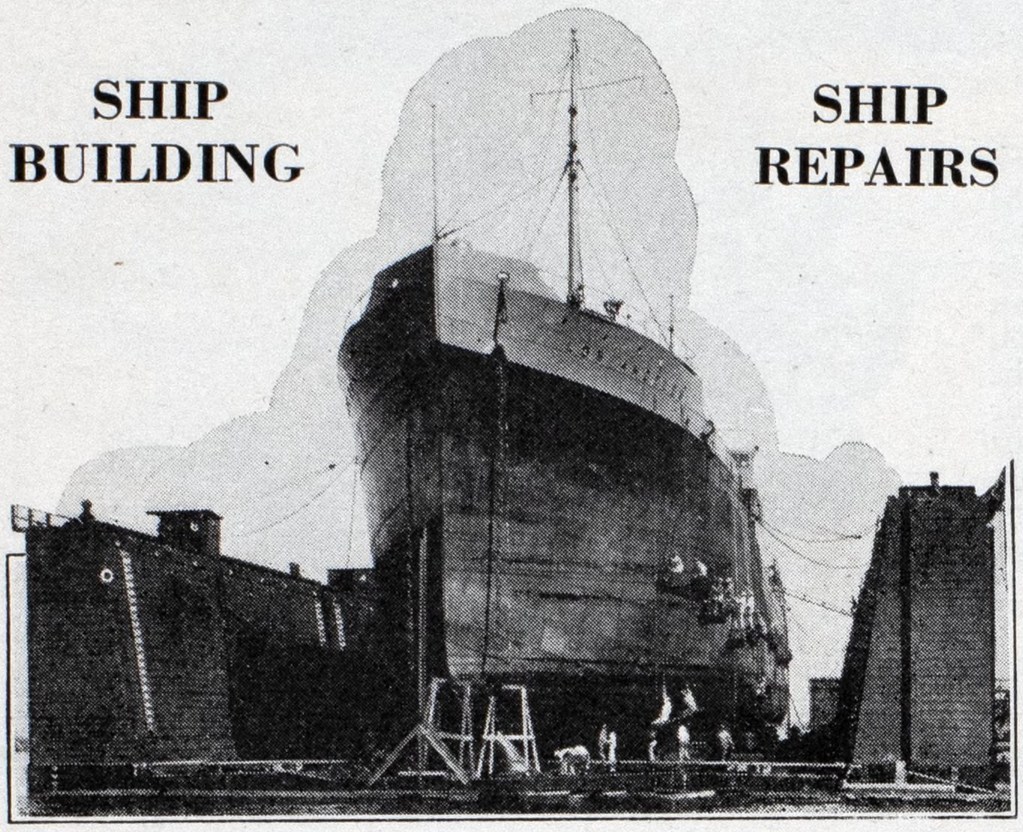
LOS ANGELES
SHIPBUILDING & DRYDOCK CORPORATION
SAN PEDRO, CALIFORNIA

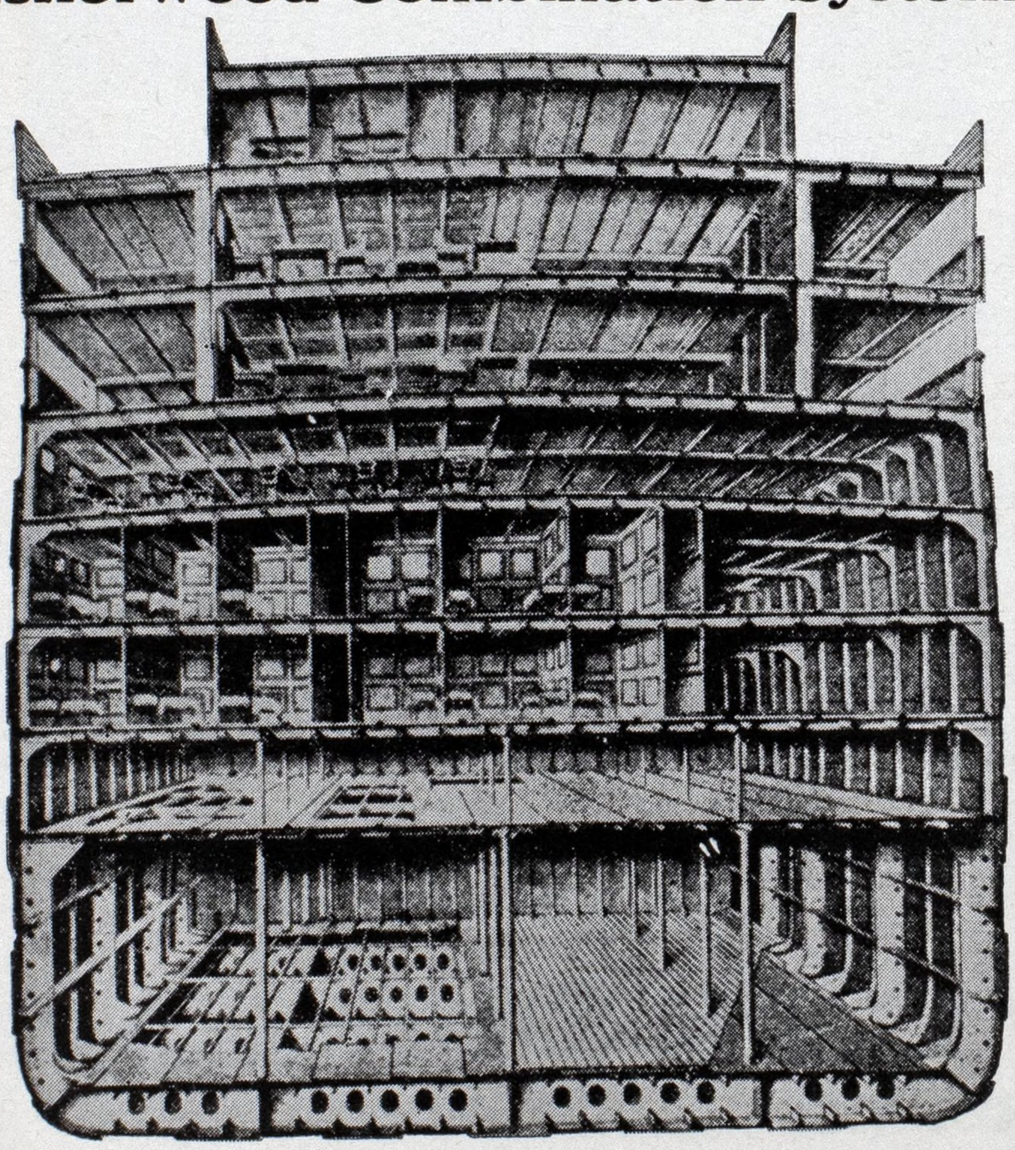
40 Acres of Modern Shipbuilding Equipment
To Meet Every Requirement

Floating Drydock—12,000 Tons Capacity

SHIP BUILDING **SHIP REPAIRS**



Isherwood Combination System



Sectional View of Interior of Passenger Liner designed on the Isherwood Combination System
(In a vessel of this type, deep transverses are recommended for hold construction, but are not essential.)
Adaptable to any type but particularly advantageous for passenger liners.

Shipowners are advised to specify that plans and structural arrangements should be approved by

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17 BATTERY PLACE, NEW YORK
and 4, LLOYD'S AVENUE, LONDON, E. C. 3

2

Western Maryland Railway
Tidewater Terminals,
Port Covington, Baltimore, Md.

NEW DOCKS and WAREHOUSES

Cost $8,500,000

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Most Modern Ocean Terminal on Atlantic Coast.

Direct handling of cargo between cars and ships—cars and warehouses—ships and warehouses.

These new facilities will add to our existing terminal equipment at Baltimore 920,000 sq. ft. of floor space—120,000 cargo tons of storage capacity.

Electrically operated travelling bridge cranes—electric tractors and trailers.

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"Shore Line to Middle West"

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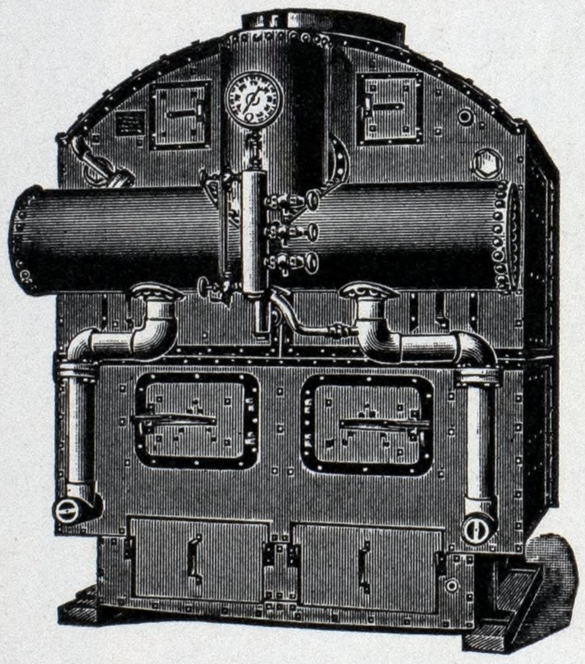

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Almy Water Tube Boiler Co.

Builders of Sectional Water Tube Boilers for all types of vessels

Providence, R. I. U. S. A.

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If you have a passenger ship, freighter, tanker, tug or any other floating property or marine equipment for sale advertise it in Marine Review.

The rate is $3.00 for a minimum advertisement of 30 words. Additional words, 10c each.

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BALTIMORE, MD.

Drydocking, Shipbuilding and Ship Repairs of All Kinds
The Most Modern Shops in Baltimore **2—9000 Ton Floating Drydocks**
Floating Machine Shop
DAY and NIGHT SERVICE
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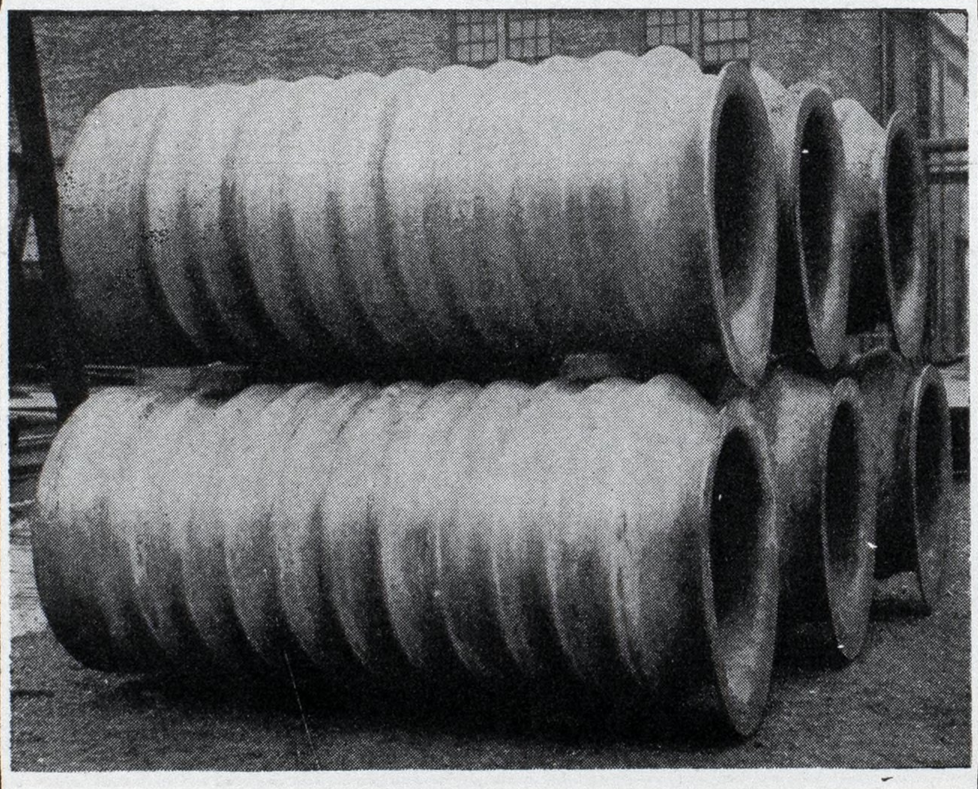
BABCOCK & WILCOX Water-Tube Boilers, Superheaters, Oil Burners and No. 80 Fire Brick, for the new steamers of the Atlantic, Gulf & West Indies Steamship Lines, to operate at 300 pounds pressure and 200 degrees superheat, indicate not only the marked advance in recent years towards higher efficiency and economy in the operation of steam-driven vessels, but are the latest and best practice in the field of Naval Architecture and Marine Engineering.

THE BABCOCK & WILCOX CO.

Manufacturers of Marine Water-Tube Boilers Since 1895

SAN FRANCISCO NEW YORK CLEVELAND



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A full range of sizes

The largest plant capacity in America with more than a thousand tons of firebox furnace plates in stock enables us to meet your demands for quick delivery. Continuous production for many years gives assurance of superior quality.

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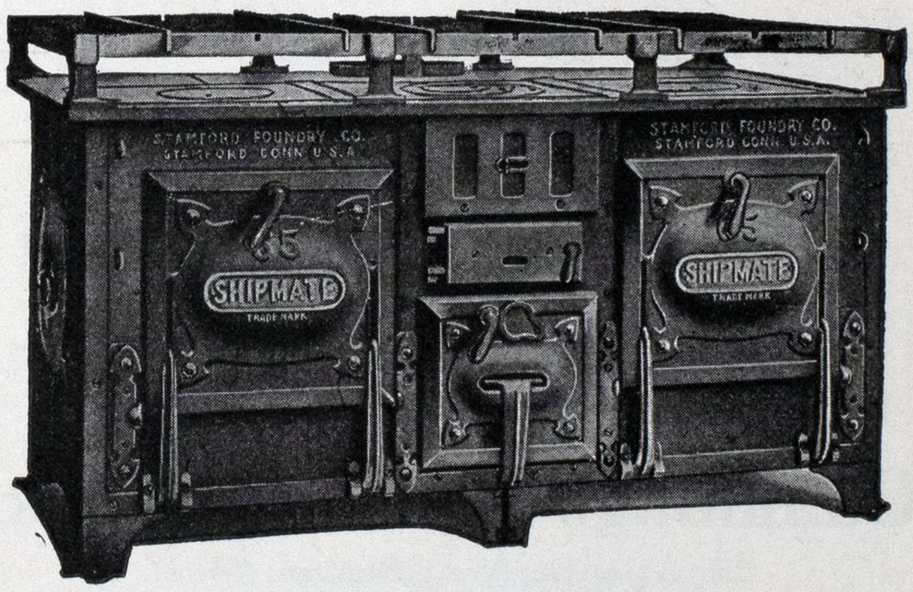


No. 65 SHIPMATE Range

Did you ever notice that if a dealer has to urge the sale of a vessel range it is not a SHIPMATE that he is trying to sell ?

SHIPMATES are made only by

THE STAMFORD FOUNDRY COMPANY

Established 1830 Stamford, Conn.

VERSATILITY

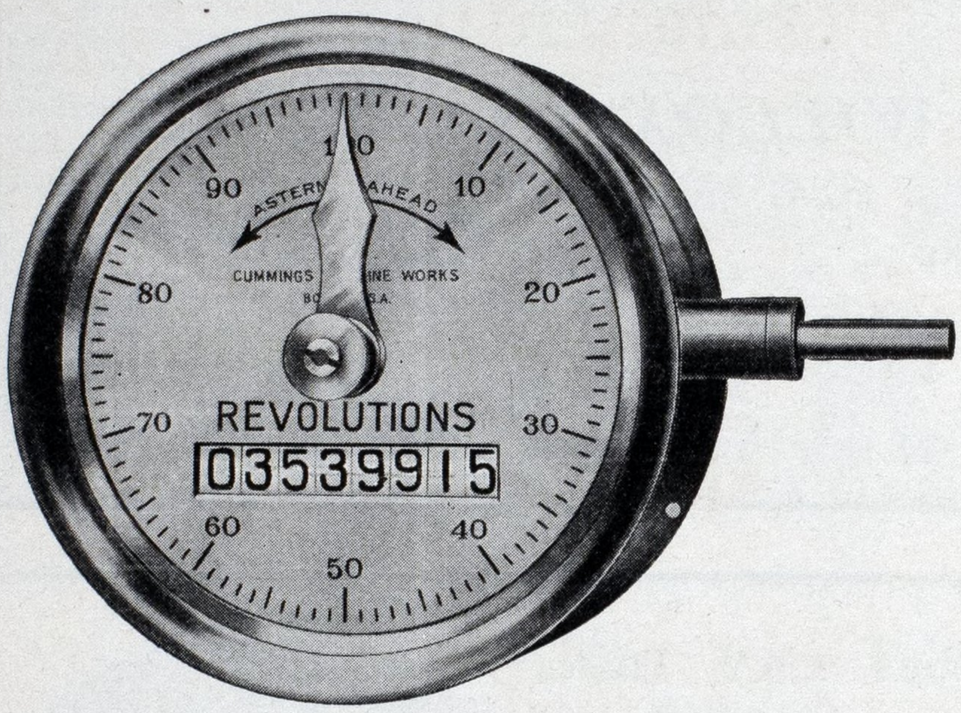
TEC Equipment is pre-eminent for loading and unloading ships. If railroad track is not available at shipside, TEC trucks can haul big tonnages on distances under a mile at costs lower than by other methods. TEC Trucks eliminate distance between ship and railroad car or ship and warehouse.

Terminal Engineering Co.

17 Battery Place, New York, N. Y.

Cummings

Combination Counter & Telltale



Adopted by the Panama Pacific Line on
S. S. California
S. S. Virginia
S. S. Pennsylvania

Cummings Revolution Counters and Gary-Cummings Torsion Meters

have been used on
U. S. Naval Vessels Since 1912

Cummings Machine Works

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MARINE PUMPS

"The Dean of Pumps on Land and Sea"

Single Style & Duplex
Piston Type & Plunger

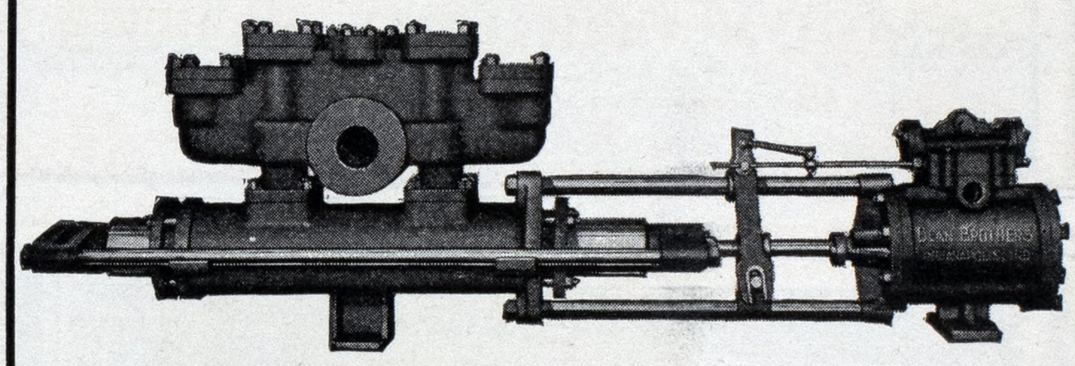

Figure No. 2311 Horizontal Single Style Double Acting Outside End Packed Plunger Trombone Pot Valve Pump For Boiler Feed & Pressure Service.

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MANUFACTURERS OF PUMPING MACHINERY FOR ALL PURPOSES

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Heat Transfer Apparatus

Reilly Heaters
For boiler feed and general service
Serving over 12,000,000 BHP

Evaporators
(Scale-Shedding)
Bentube and Reilly Types
Serving over 10,000,000 BHP

Multiwhirl Coolers
For cooling oil to turbine bearings and reduction gears. For cooling Diesel engine jacket water.
Thousands in use.

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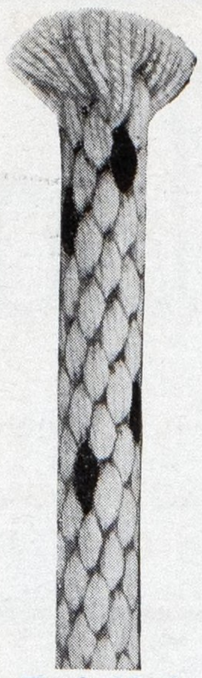
Log Lines



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We also manufacture flag halyards, lead lines, tiller rope; solid braided cotton cord in all sizes for various marine uses. Ask for catalog and samples.

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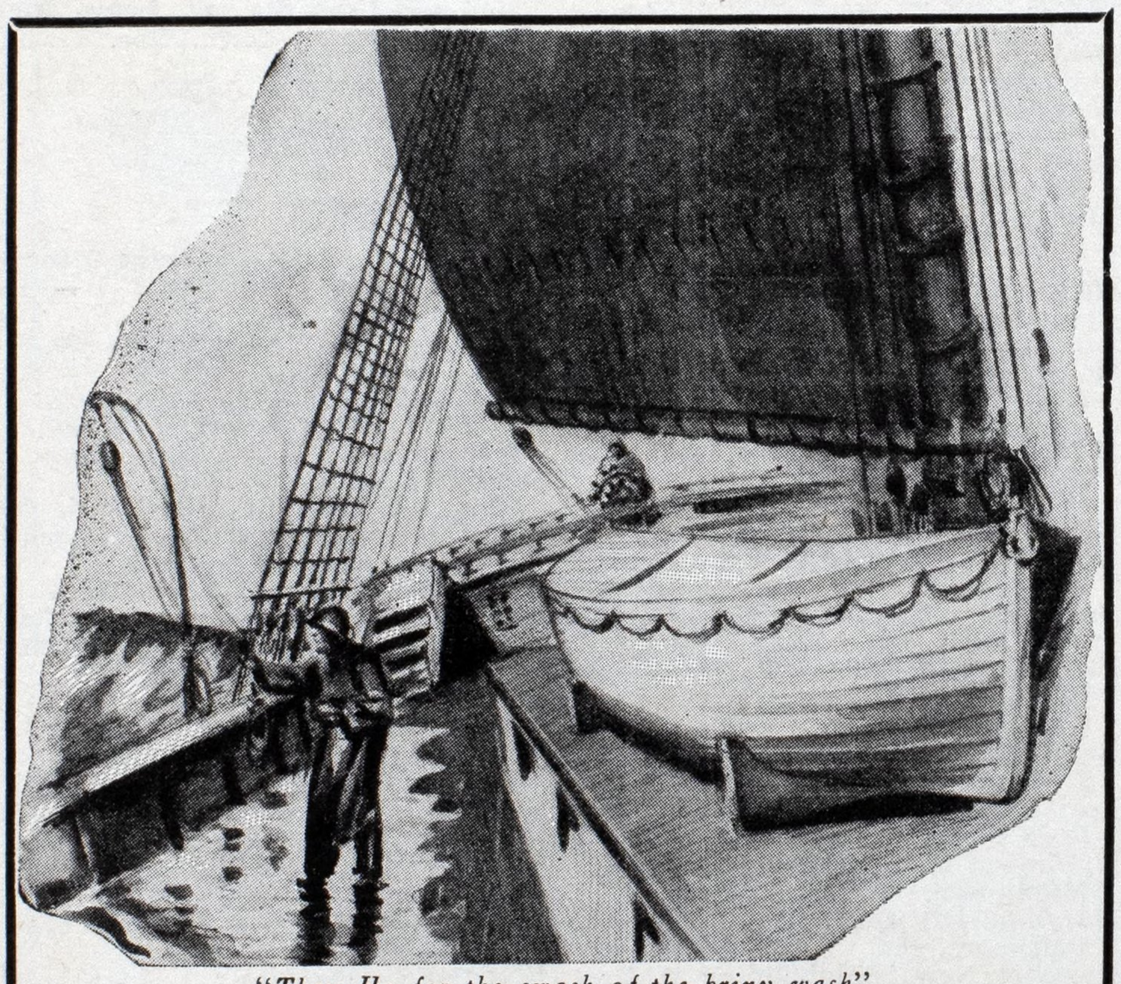

"Then Ho for the swash of the briny wash"

In heavy weather, a tight deck is just as important as tight seams. Poor deck caulking means ruined cargoes, wet sleeping quarters, food spoilage and many annoyances.

Caulk your deck with

STRATFORD OAKUM

Make it as tight as your garboard.

Stratford Oakum is the world's best. It is the most economical to use. It takes less labor to caulk or spin, and "stays put" whether in bottom, side or deck. Stratford Oakum is well finished, well tarred, clean and elastic enough to keep the seam tight always.

Be sure to use Stratford Oakum.

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Jersey City, New Jersey
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Thoroughly water-resisting

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Oldman-Magee Boiler Works, Inc., 36-40 Illinois St., Buffalo, N. Y.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Toledo Shipbuilding Co., Toledo, O.

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Penton Publishing Co., Cleveland, O.

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Farley, Edward P., & Co., Inc., 11 Broadway, New York City.

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BURNERS (Oil)—See OIL BURNING EQUIPMENT

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Whitlock Cordage Co., 46 South St., New York City.

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Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

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Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.
Worthington Pump & Machy. Corp., Harrison, N. J.

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Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St., New York City.

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DIESEL ENGINES—See ENGINES (Diesel)

DIESEL FUEL OIL—See FUEL OIL

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Great Lakes Engineering Works, River Rouge, Mich.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

DREDGING MACHINERY
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Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

DRINKING FOUNTAINS
Haydenville Co., The, Haydenville, Mass.

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Great Lakes Engineering Works, River Rouge, Mich.
Los Angeles Shipbuilding & Dry Dock Corp., San Pedro, Cal.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
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Engberg's Electric & Mechancial Works, 2229 Vine St., St. Joseph, Mich.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

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EJECTORS (Ash)
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Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill.
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Standard Motor Construction Co., 172 Whiton St., Jersey City, N. J.
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Cooper-Bessemer Corp., The, Grove City, Pa.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
Fulton Iron Works Co., St. Louis, Mo.
McIntosh-Seymour Corp., Auburn, N. Y.
Morris, I. P., & De La Vergne, Inc., Richmond & Norris Sts., Philadelphia, Pa.
Standard Motor Construction Co., 172 Whiton St., Jersey City, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Winton Engine Co., The, 2116 W. 106th St., Cleveland, O.
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Busch-Sulzer Bros.-Diesel Engine Co., 2nd and Utah Sts., St. Louis, Mo.
Cooper-Bessemer Corp., The, Grove City, Pa.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
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Standard Motor Construction Co., 172 Whiton St., Jersey City, N. J.
Worthington Pump & Machy. Corp., Harrison, N. J.

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Bethlehem Shipbuilding Corp., Bethlehem, Pa.
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Canada Steamship Lines, P. O. Box 2430, Montreal, Can.
Cooper-Bessemer Corp., The, Grove City, Pa.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
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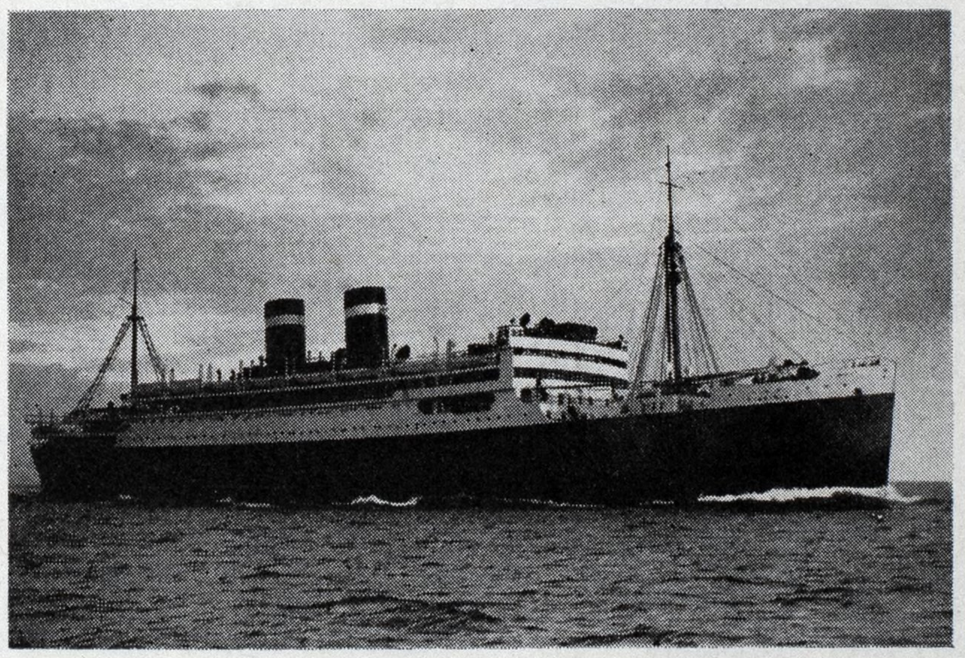
Statement of the ownership, management, circulation, etc., required by the act of congress of Aug. 24, 1912, of MARINE REVIEW published monthly at Cleveland, Ohio, for October 1, 1929. State of Ohio, county of Cuyahoga, ss. Before me, a notary public in and for the state and county aforesaid, personally appeared C. J. Stark, who, having been duly sworn according to law, disposes and says that he is the President of MARINE REVIEW, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of Aug. 24, 1912, embodied in section 443, Postal laws and regulations, to wit: 1.—That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The Penton Publishing Co., Cleveland, O. Editor, A. H. Jansson, Cleveland, O. Advertising manager, J. D. Pease, Cleveland, O., Circulation manager, none. 2.—That the owners are: Names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock: The Penton Publishing Co., Cleveland, O.; John A. Penton, Cleveland, O.; C. J. Stark, Cleveland, O.; H. C. Estep, Cleveland, O.; J. D. Pease, Cleveland, O.; F. V. Cole, Cleveland, O.; J. R. Dawley, Cleveland, O. 3.—That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None. 4.—That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. C. J. Stark. Sworn to and subscribed before me this 24th day of September, 1929. (Seal) H. L. Richey. (My commission expires May 7, 1930.) *

THE LARGEST



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Ingersoll-Rand Co., 11Broadway, New York City.
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Sun Shipbuilding & Dry Dock Co., Chester, Pa.
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New York Shipbuilding Co., Camden, N. J.

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Vacuum Oil Co., 61 Broadway, New York City.

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Sperry Gyroscope Co., The, Brooklyn, N. Y.

INDICATORS (Speed)
Sperry Gyroscope Co., The, Brooklyn, N. Y.

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Cooper-Bessemer Corp., The, Grove City, Pa.
Great Lakes Engineering Works, River Rouge, Mich.
Los Angeles Shipbuilding & Dry Dock Corp., San Pedro, Cal.
Manitowoc Ship Building Corp., Manitowoc. Wis.
Maryland Dry Dock Co., Baltimore Md.
Toledo Shipbuilding Co., Toledo, O.

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Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
New York Shipbuilding Co., Camden, N. J.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

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Titusville Forge Co., Titusville, Pa.

MATERIAL HANDLING EQUIPMENT
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.

METERS (Water & Oil)
Worthington Pump & Machy. Corp., Harrison, N. J.

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Diehl Mfg. Co., Elizabethport, N. J.
Engberg's Electric & Mechanical Works, 2229 Vine St., St. Joseph, Mich.
Fairbanks, Morse & Co., 900 South Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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Diehl Mfg. Co., Elizabethport, N. J.
Engberg's Electric & Mechanical Works, 2229 Vine St., St. Joseph, Mich.
Fairbanks, Morse & Co., 900 Wabash Ave., Chicago.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

MOTORS (Winch)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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Sperry Gyroscope Co., The, Brooklyn, N. Y.

NAVIGATING INSTRUMENTS
White, Kelvin & Wilfrid O., Co., 112 State St.. Boston. Mass.

NITROGEN (Gas)
Linde Air Products Co., 30 East 42nd St., New York City

OAKUM (Marine, Rope, Packings, Plumbers)
Stratford, George, Oakum Co., 165 Cornelison Ave., Jersey City, N. J.

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Babcock & Wilcox Co., 85 Liberty St., New York City.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

OIL CLARIFIERS
Sharples Specialty Co., Westmoreland, Philadelphia.

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Texas Co., The, 17 Battery Place, New York City.
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Sharples Specialty Co., Westmoreland, Philadelphia, Pa.

OXYGEN (Gas)
Linde Air Products Co., 30 East 42nd St.. New York City.

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American Hammered Piston Ring Co., Baltimore, Md.

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Taylor Forge and Pipe Works, 1440 S. 49th St., Chicago, Ill.

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American Hammered Piston Ring Co., Baltimore, Md.

PLATES (Sheared Steel)
Wood, Alan, Steel Co., Conshohocken, Pa.

PLATES (Steel Floor)
Wood, Alan, Steel Co., Conshohocken, Pa.

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Sheriffs Mfg. Co., Milwaukee, Wis.

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American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Great Lakes Engineering Works, River Rouge, Mich.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Sheriffs Mfg. Co., Milwaukee, Wis.
Toledo Shipbuilding Co., Toledo, O.
Trout, H. G Co., 220 Ohio St., Buffalo, N. Y.

PROPELLERS
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.

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Todd Shipyards Corp., 25 Broadway, New York City.

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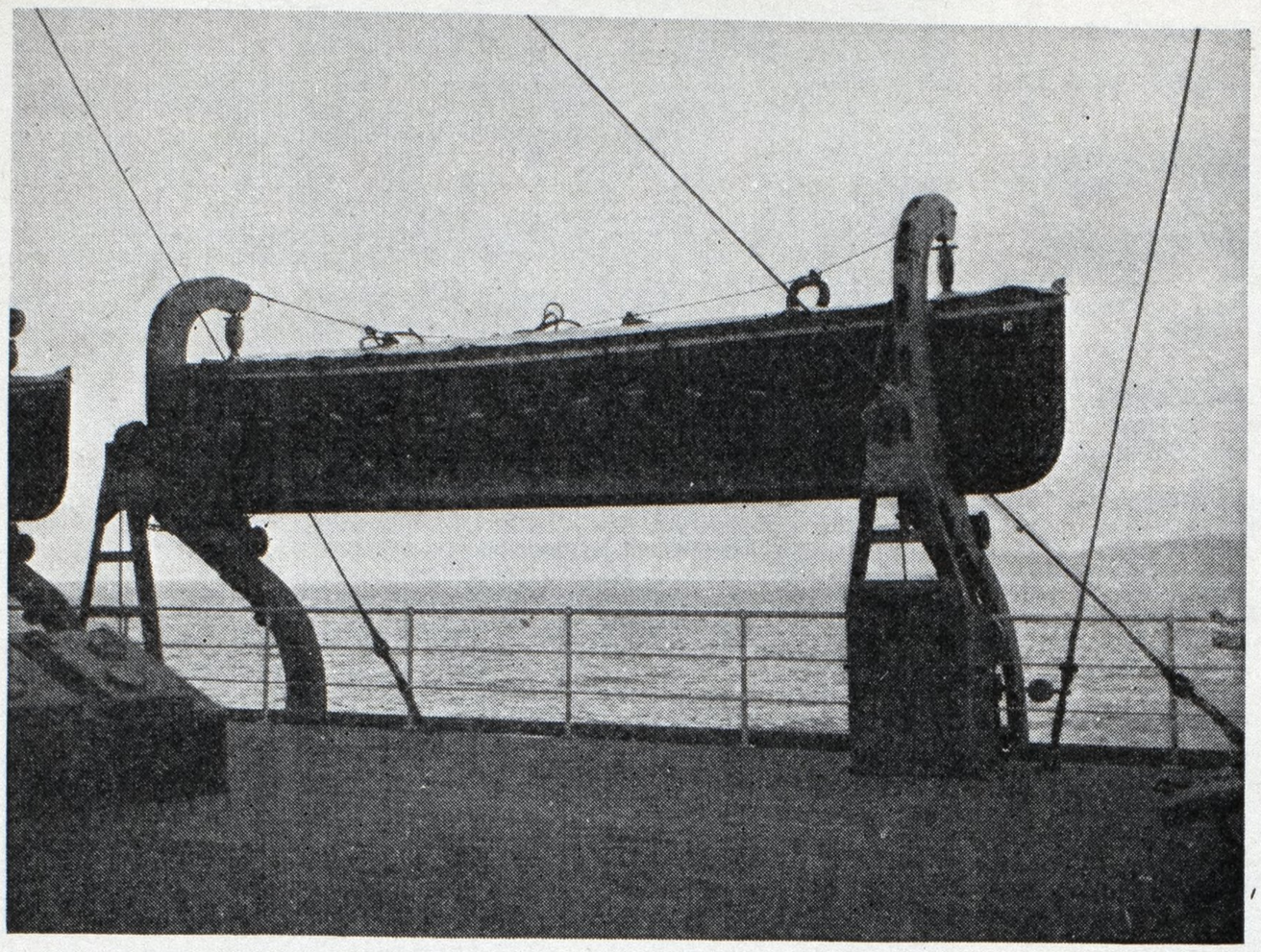
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above



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LONG ISLAND CITY, N. Y.

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Hamburg-American Line
39 Broadway New York

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WERE SUPPLIED TO THE

KNOWN THE WORLD OVER — LANE — OLDEST IN THE U.S.A.

BYRD ANTARCTIC EXPEDITION

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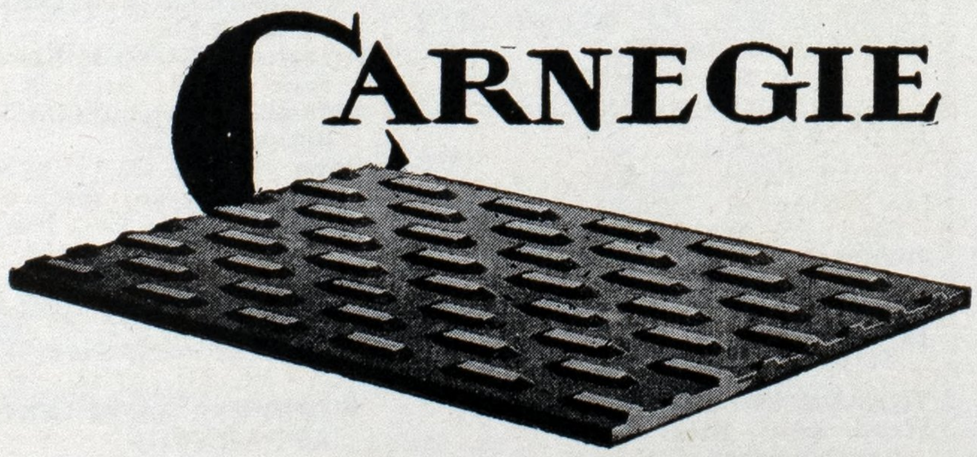

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Thickness—$\frac{3}{16}$" to $\frac{3}{4}$" exclusive of raised figure.
Width —6" to 66".
Weight —8.8 to 31.7 pounds per square foot.
Recommended for floors, sidewalk openings, stair and traffic treads, where a safe, secure foothold is required. This design drains and cleans easily.

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Subsidiary of UNITED STATES STEEL CORPORATION
CARNEGIE BUILDING, PITTSBURGH, PA.

PUMPS
Great Lakes Engineering Works, River Rouge, Mich.
Ingersoll-Rand Co., 11 Broadway, New York City.
Warren Steam Pump Co., Inc., Warren, Mass.

PUMPS (Ballast)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Warren Steam Pump Co., Inc., Warren, Mass.
Worthington Pump & Machy. Corp., Harrison, N. J.

PUMPS (Bilge)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
Warren Steam Pump Co., Inc., Warren, Mass.
Worthington Pump & Machy. Corp., Harrison, N. J.

PUMPS (Boiler Feed)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
Warren Steam Pump Co., Inc., Warren, Mass.
Worthington Pump & Machy. Corp., Harrison, N. J.

PUMPS (Centrifugal)
Worthington Pump & Machy. Corp., Harrison, N. J.

PUMPS (Direct Acting)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Worthington Pump & Machy. Corp., Harrison, N. J.

PUMPS (Fuel Oil)
Worthington Pump & Machy. Corp., Harrison, N. J.

PUMPS (Power)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
Worthington Pump & Machy. Corp., Harrison, N. J.

PUMPS (Steam)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.
Warren Steam Pump Co., Inc., Warren, Mass.
Worthington Pump & Machy. Corp., Harrison, N. J.

PUMPS (Vacuum)
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Worthington Pump & Machy. Corp., Harrison, N. J.

PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

PURIFIERS (Oil)
Sharples Specialty Co., Westmoreland, Philadelphia.

RADIO COMPASS AND DIRECTION FINDER
Radiomarine Corp. of America, 66 Broad St., New York City.

RADIO EQUIPMENT
Radiomarine Corp. of America, 66 Broad St., New York City.

RAFTS
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn, N. Y.

RANGES
Stamford Foundry Co., Stamford, Conn.

REPAIRS
Los Angeles Shipbuilding & Dry Dock Corp., San Pedro, Cal.
Maryland Dry Dock Co., Baltimore. Md.

REPAIRS (Electric)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

REPAIRS (Marine)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Canada Steamship Lines, P. O. 2435, Montreal, Can.
Chicago Shipbuilding Co., So. Chicago, Ill.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
Toledo Shipbuilding Co., Toledo, O.
United Dry Docks, Inc., 11 Broadway, New York City

REPAIRS (Turbine)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

REVOLUTION COUNTERS
Cummings Machine Works, 255 Atlantic Ave., Boston, Mass.
Sperry Gyroscope Co., Manhattan Bridge Plaza, Brooklyn, N. Y.

ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co., 46 South St., New York City.

ROPE (Transmission)
Columbian Rope Co., Auburn, N. Y.

ROPE OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

RUBBER TILE
Selby, Battersby & Co., 810 Noble St., Philadelphia, Pa.

RUST PREVENTATIVE (Oil)
Texas Co., The, 17 Battery Place, New York City.
Vacuum Oil Co., 61 Broadway, New York City.

SAFETY VALVES (Marine)
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Toledo Shipbuilding Co., Toledo, O.

SEARCHLIGHTS (High Intensity)
Sperry Gyroscope Co., The, Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc)
General Electric Co., Schenectady, N. Y.
Sperry Gyroscope Co., The, Brooklyn, N. Y.

SELF UNLOADING EQUIPMENT
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.

SEPARATORS (Oil)
Babcock & Wilcox Co., 85 Liberty St., New York City.
Sharples Specialty Co., Westmoreland, Philadelphia.

SHEETS (Blue Annealed)
Wood, Alan, Steel Co., Conshohocken, Pa.

SHIPBUILDERS
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Canada Steamship Lines, P. O. Box 2430, Montreal, Can.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Great Lakes Engineering Works, River Rouge, Mich.
Los Angeles Shipbuilding & Dry Dock Corp., San Pedro, Cal.
Manitowoc Ship Building Corp., Manitowoc, Wis.
Maryland Dry Dock Co., Baltimore, Md.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
New York Shipbuilding Co., Camden, N. J.
Smith, Leathem D., Dock Co., Sturgeon Bay, Wis.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
Toledo Shipbuilding Co., Toledo, O.
United Dry Docks, Inc., 11 Broadway, New York City.

SHIPBUILDING SYSTEMS
Isherwood, J. W., & Co., Ltd., 17 Battery Place, New York City.

SHIP CONSTRUCTION (Channel System)
Atlantic Ellis Channel System, Inc., 33 Rector St., New York City.

SHIP STABILIZERS
Sperry Gyroscope Co., The, Brooklyn, N. Y.

SIGNALS (SUBMARINE)
Submarine Signal Co., 160 State St., Boston. Mass

SLEEVES (Tail Shaft)
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh.

SOUNDING MACHINES
Submarine Signal Co., 160 State St., Boston, Mass.

SPUN OAKUM
Stratford, George, Oakum Co., Jersey City, N. J.

STEAMSHIP LINES (Passenger and Freight)
Hamburg-American Lines, 39 Broadway, New York City.

STEAM GAGES
Star Brass Mfg. Co., 53 Oliver St., Boston, Mass.

STEAM TRAPS
Davis Engineering Co., 90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEERING ENGINES
Hyde Windlass Co., Bath, Me.

STEERING GEARS
American Engineering Co., Cumberland & Aramingo Sts., Philadelphia.
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Hyde Windlass Co., Bath, Me.

STORAGE BATTERIES—See BATTERIES

STOVES
Stamford Foundry Co., Stamford, Conn.

SUPERHEATERS (Marine)
Foster Wheeler Corp., 165 Broadway, New York City.

SWITCHBOARDS
Engberg's Electric & Mechanical Works, 2229 Vine St., St. Joseph, Mich.
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TELEMOTORS
Hyde Windlass Co., Bath, Me.

TELEMOTORS (Electric & Hydraulic)
American Engineering Co., Cumberland & Aramingo Sts., Philadelphia.

TORSION METERS
Cummings Machine Works, 255 Atlantic Ave., Boston, Mass.

TOWING & MOORING ENGINES
American Engineering Co., Cumberland & Aramingo Sts., Philadelphia.

TOWING LINES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co., 46 South St., New York City.

TRACTORS
Clark Tructractor Co., Battle Creek, Mich.
Lewis-Shepard Co., Watertown Sta., 125 Walnut St., Boston.
Terminal Engineering Corp., 17 Battery Place, New York City.

TRANSMISSION (Rope)—See ROPE (Transmission)

TREADS (Steel Stair & Ladder)
Wood, Alan, Steel Co., Conshohocken, Pa.

TRUCKS
Clark Tructractor Co., Battle Creek, Mich.
Lewis-Shepard Co., Watertown Sta., 125 Walnut St., Boston.

TRUCKS (Lift)
Terminal Engineering Corp., 17 Battery Place, New York City.

TURBINES (Electric)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

TURBINES (Marine)
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

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Newport News Shipbuilding & Dry Dock Co., 233 Broadway, New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
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Columbian Rope Co., Auburn, N. Y.
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Whitlock Cordage Co., 46 South St., New York City.

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Diehl Mfg. Co., Elizabethport, N. J.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

WATER PURIFICATION SYSTEMS
Griscom-Russell Co., 285 Madison Ave., New York City.

WELDERS (Electric Arc)
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

WELDING AND CUTTING GAS
Prest-O-Lite Co., Inc., 30 East 42nd St.. New York City.

WHISTLES
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WINCHES
American Engineering Co., Cumberland & Aramingo Sts., Philadelphia.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDLASSES
American Engineering Co., Cumberland & Aramingo Sts., Philadelphia.
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Bethlehem Shipbuilding Corp., Ltd., Bethlehem, Pa.
Dake Engine Co., Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WIRELESS MESSAGE SERVICE
Radiomarine Corp. of America, 66 Broad St., New York City.

WIRELESS SETS AND APPARATUS
Radiomarine Corp. of America, 66 Broad St., New York City.

WORKBOATS
Lane, C. M., Lifeboat Co., Inc., 856 Humboldt St., Brooklyn.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above

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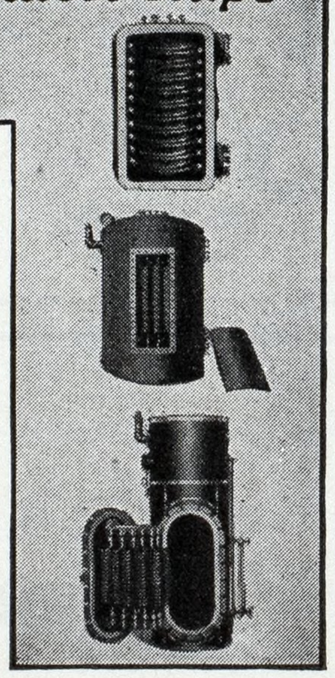

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Factory: Elizabeth, N. J.

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avoid delays by using the

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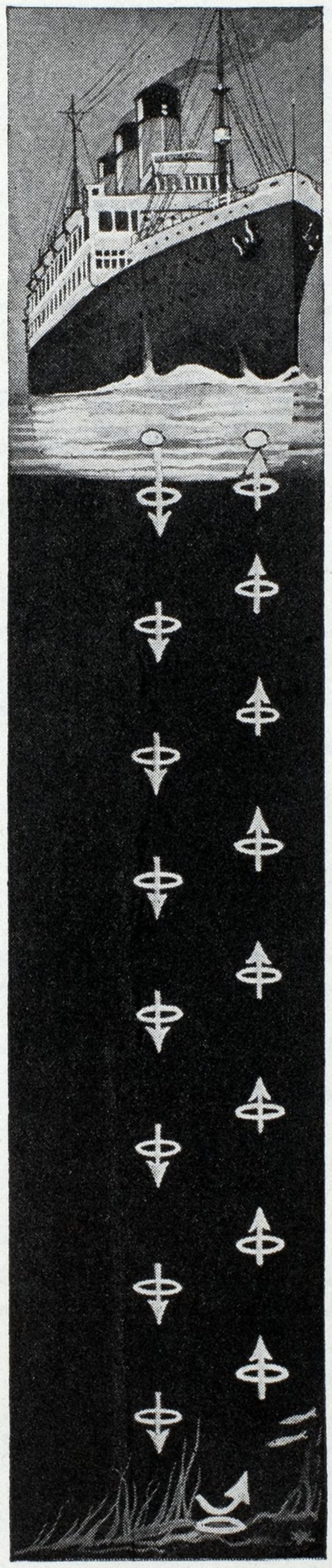
FATHOMETER Echo Soundings flashing on a Dial give instant depth measurements.



Accurate soundings indicated constantly allow the Navigator at all times to check the position of his ship. Delays occur during thick weather through the lack of constant knowledge of position. Time saved with a Fathometer reduces shipping costs.

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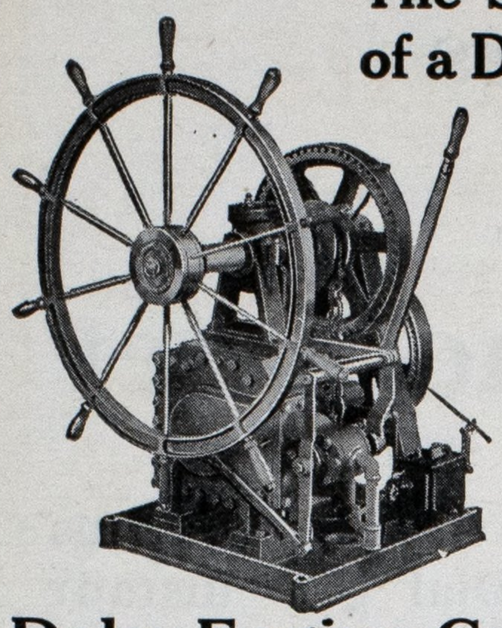
Oscillators *for* Submarine Signaling
Submarine Receivers *for* Direction Finding
Synchronous Signal Equipment *for* Distance Finding

The Strong, Quick Arm of a DAKE Steering Gear



on the tiller chain of your tug or steamer means greater efficiency, safety and economy.

The Dake Engine has no dead center; it is always alert, and starts instantly in either direction. This insures easier, quicker and better handling of your boat and saves time, coal and accidents.

The Dake fits into your pilot house and has a hand steering combination feature for emergency use.

Dependable gears at extremely moderate prices.

Ask any skipper who is shipmates with one

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Propeller Wheels and Blades

to fit any hub.

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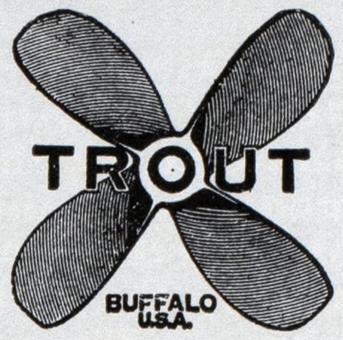
Established 1854

Milwaukee, Wis.



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Sturgeon Bay, Wisconsin

Self-Unloading Boats our Specialty *Self Propelled and Self Unloading River Boats*
Wood and Steel Repair Work

Kelvin & Wilfrid O. White Co.

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Navigational Equipment

Contracts a Specialty

New York and Montreal

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Write for free samples and quotations.

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Boilers, Tanks, Stacks, Structural Work and Castings

Boiler Repairing Promptly Attended to Day or Night

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Works: 36-40 Illinois Street - BUFFALO, N. Y.

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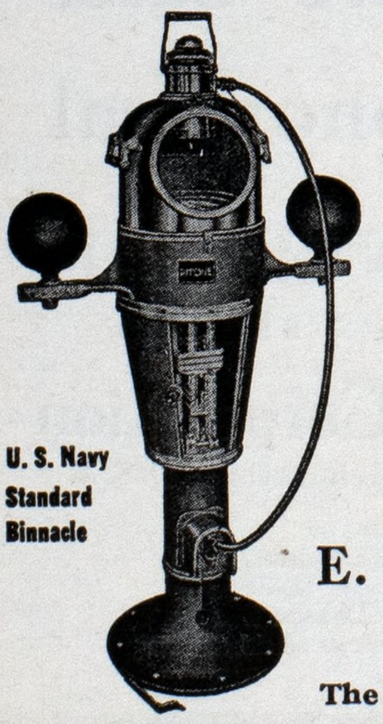

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THE RITCHIE LIQUID COMPASS

The Standard Liquid Compass the world over.

Used Exclusively in U. S. Navy for over 40 years.

Over 65,000 on Merchant Vessels in all parts of the world.

Made in all sizes 2 to 12" dia.

Magnets for adjusting Purposes.

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The Upson-Walton Company, Cleveland, Ohio

Edward P. Farley & Co.

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Marine Insurance Agents

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Six words must be added for box address.

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4c per word—minimum advertisement—$1.00

Please have remittance accompany order.

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FOR SALE: STEAMER GRANDON. LENGTH 64 ft. Beam 16 ft. For further particulars write The Post Fish Co., Sandusky, Ohio.

SEABURY BOILER: WATER TUBE BOILER No. 495, built in 1924, used 3 months. Equipped with double oil burners using heavy oil.

Speedway Engine for the above boiler, 8½ x 14 x 23 x 12. Address Box 409, MARINE REVIEW, Cleveland, Ohio.

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STEWARD WANTED FOR 85 FOOT YACHT. Home port Milwaukee. Season 1930 beginning April 15th. Must be good cook, cheerful, absolutely clean, good record, and have desire to please. Write Box 410, MARINE REVIEW, Cleveland, Ohio.

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STEAM FISHING TUGS

THE CASE FISH CO.
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CLEVELAND, OHIO

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5000-Ton Bulk Carrier
Steamer Rockefeller
Toledo, Ohio
Recently rebuilt.
The Central Dredging Co.
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FOR SALE
COMPLETE COMPRESSOR INSTALLATION

1—9 x 8 ER-1 Compressor with Idler, unloader and lubricator.
1—30 H.P. G. E. Motor 3 phase, 60 cycle, 220 volt A.C., base, pulley and starter.
1—R-6 Receiver, 36″ x 8′, complete with all fittings.

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New Orleans, La.

FOR SALE: 5000 TON BULK CARRIER Steamer Rockefeller, Toledo, O. Recently rebuilt. The Central Dredging Co., Chicago.

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Mail copy for your advertisement in the December issue today, so it reaches us before November 20.

Index To Advertisers

Almy Water Tube Boiler Co. . . 110
American Bridge Co. 11
American Engineering Co. . . . 51
American Hammered Piston Ring Co., The 35
American Ship Building Co. . . 4
Atlantic Ellis Channel System, Inc. 16

Babcock & Wilcox Co. 111
Baldt Anchor Chain & Forge Corp. 57
Bethlehem Shipbuilding Corp., Ltd. . . . . Inside Back Cover
Boland & Cornelius 120
Busch - Sulzer Bros. Deisel Engine Co. 47

Canada Steamship Lines 115
Carnegie Steel Company 117
Clark Tructractor Co. 99
Columbian Rope Co. 17
Cooper-Bessemer Corp. 44
Cummings Machine Wks. 112

Dake Engine Co. 120
Davis Engineering Corporation 119
Dean Brothers Co. 112
Diehl Mfg. Co. 53
Dixon, Joseph, Crucible Co. . . 119

Electric Storage Battery Co., The 103
Ellis Channel System, Inc. 16
Engberg's Electric & Mech. Wks. 110
Erie Forge Co. 46

Fairbanks-Morse & Co. . . . 107, 108
Farley, Edward P., & Co., Inc. 120
Federal Shipbuilding & Dry Dock Co. 7
Foster Wheeler Corp. 49
Fulton Iron Works Co. 52

General Electric Co. 9, 10
Great Lakes Engineering Wks. 18
Griscom-Russell Co., The 112
Gulf Refining Co. 56

Hamburg-American Line 117
Hooven, Owens, Rentschler Co., The 50
Hyde Windlass Co. . . . . Back Cover

Ingersoll-Rand Co. . . Front Cover
Isherwood, Sir Joseph W., & Co., Ltd. 109

Kelvin & Wilfrid O. White Co. 120

Lane, C. M., Lifeboat Co., Inc. 117
Lewis-Shepard Co. 101
Linde Air Products Co. . . . . Inside Front Cover
Los Angeles Shipbuilding & Dry Dock Corp. 109

McIntosh & Seymour Corp. . . . 8

Manitowoc Shipbuilding Corp. 45
Marble & Shattuck Chair Co. . 115
Maryland Dry Dock Co. 110
Morris, I. P. & De La Vergne, Inc. 37
Morse, Andrew J., & Son, Inc. 115
Mulholland Hatch-Fastener Co. 119

Newport News Shipbuilding & Dry Dock Co. 95
New York Shipbuilding Co. . . 5

Oldman-Magee Boiler Works, Inc. 120
Oxweld Acetylene Co. . . . . Inside Front Cover

Prest-O-Lite Co., Inc. . . . . Inside Front Cover

Radiomarine Corp. of America 105
Ritchie, E. S., & Sons 120

Samson Cordage Works 113
Selby, Battersby & Co. 120
Sharples Specialty Co., The . . 55
Shenango-Penn Mold Co. 13
Sheriffs Manufacturing Co. . . . 120
Smith, Leathem D., Dock Co. 120
Sperry Gyroscope Co. 6
Stamford Foundry Co. 111
Standard Motor Construction Co. 42
Star Brass Mfg. Co. 120
Stratford, George, Oakum Co. 113
Sturtevant, B. F., Co. Back Cover
Submarine Signal Co. 119
Sun Shipbuilding & Dry Dock Co. 12

Taylor Forge & Pipe Works . . 111
Terminal Engineering Co., Inc. 112
Texas Co., The 97
Titusville Forge Co. 58
Todd Shipyards Corp. 1
Toledo Shipbuilding Co., Inc. . 124
Trout, H. G., Co. 120

Union Carbide and Carbon Corp. . . . . Inside Front Cover
United Dry Docks, Inc. . . . 40, 41
United States Lines Operations, Inc. 15
United States Shipping Board Merchant Fleet Corporation 123

Vacuum Oil Co. 2

Warren Steam Pump Co. 48
Welin Davit & Boat Corp. 117
Western Maryland Railway . . 109
Westinghouse Elec. & Mfg. Co. 43
White, Kelvin & Wilfrid O., Co. 120
Whitlock Cordage Co. 113
Willard Storage Battery Co. . . 14
Winton Engine Co. 54
Worthington Pump & Machy. Corp. 39

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FOR YOU

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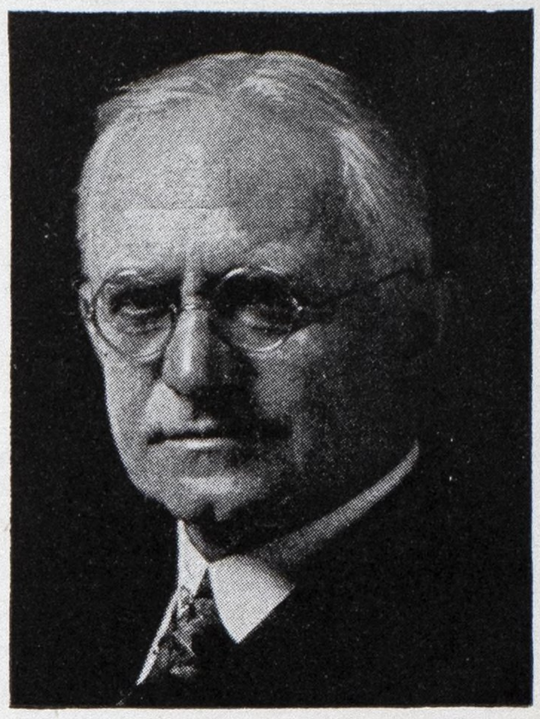

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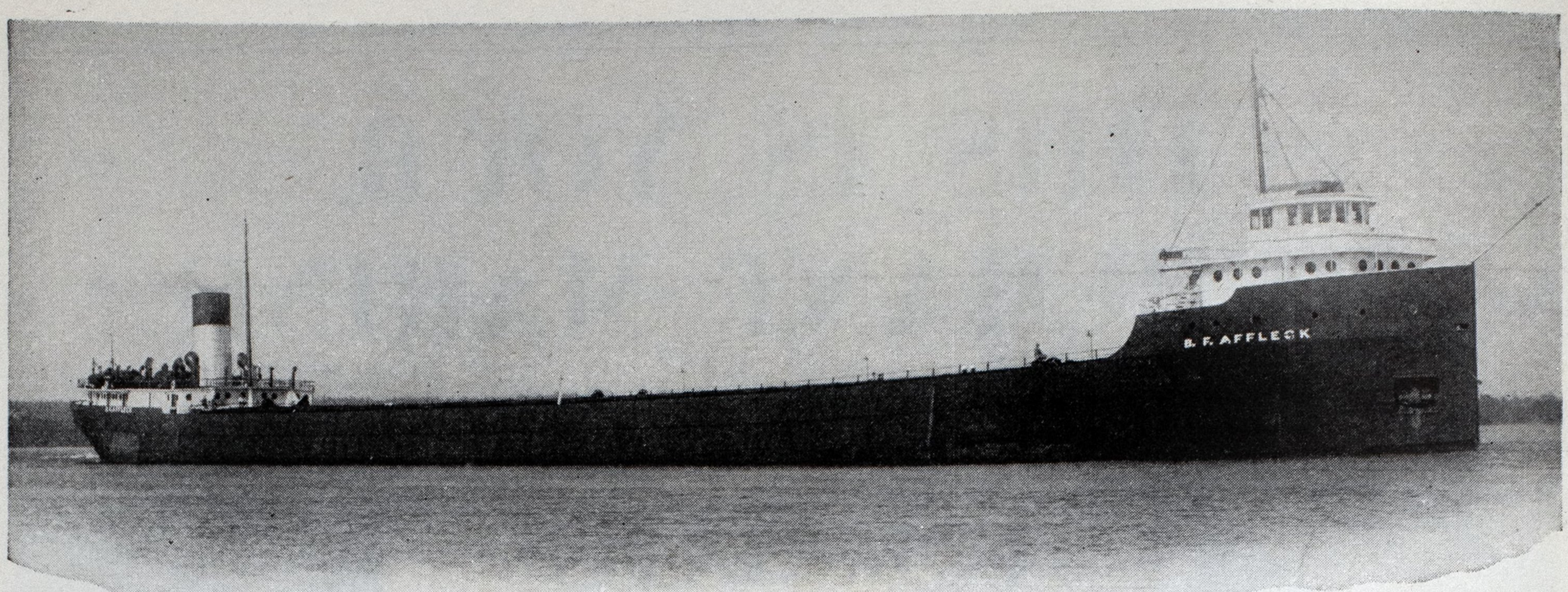

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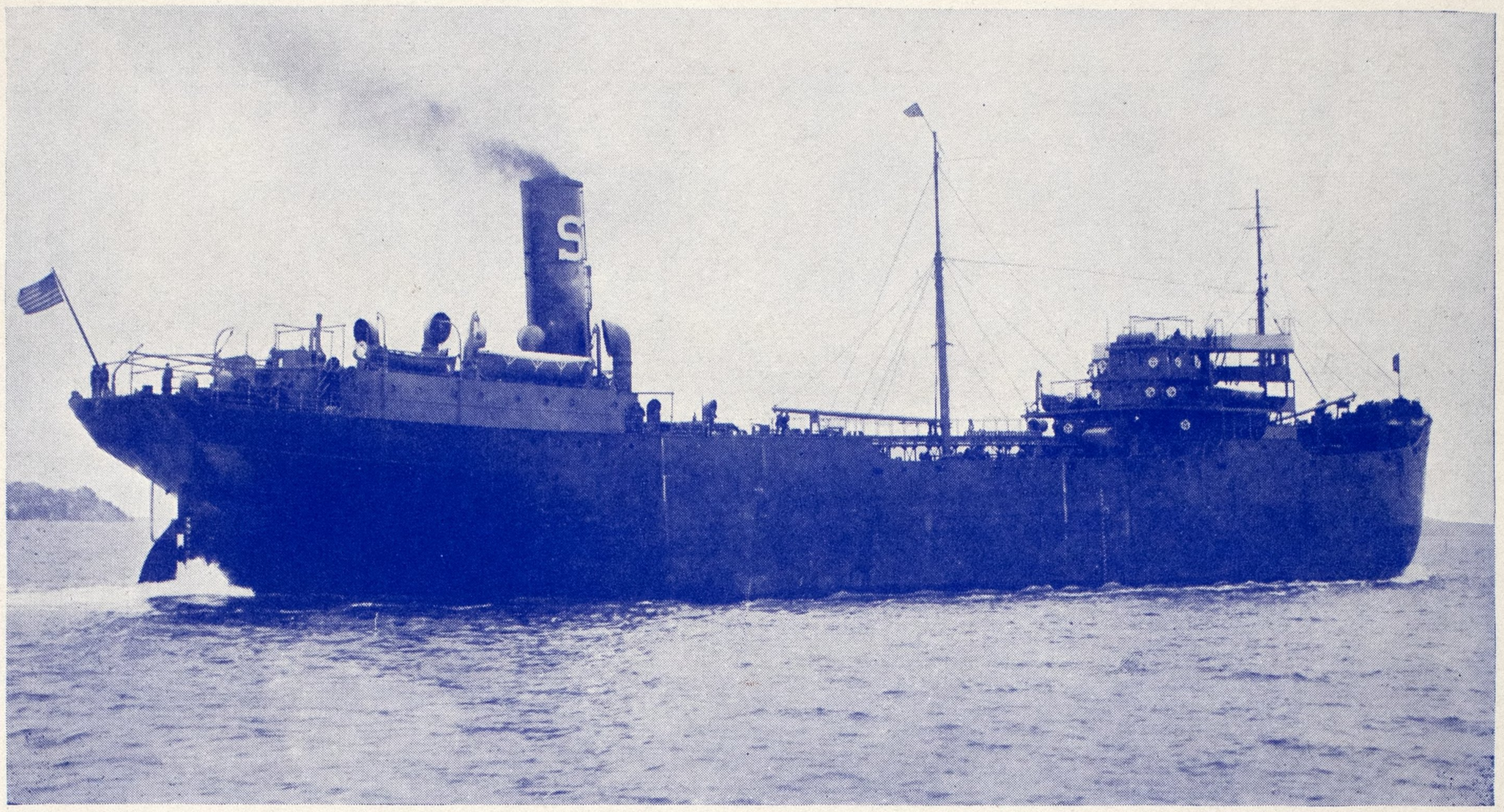

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MARINE REVIEW—November, 1929

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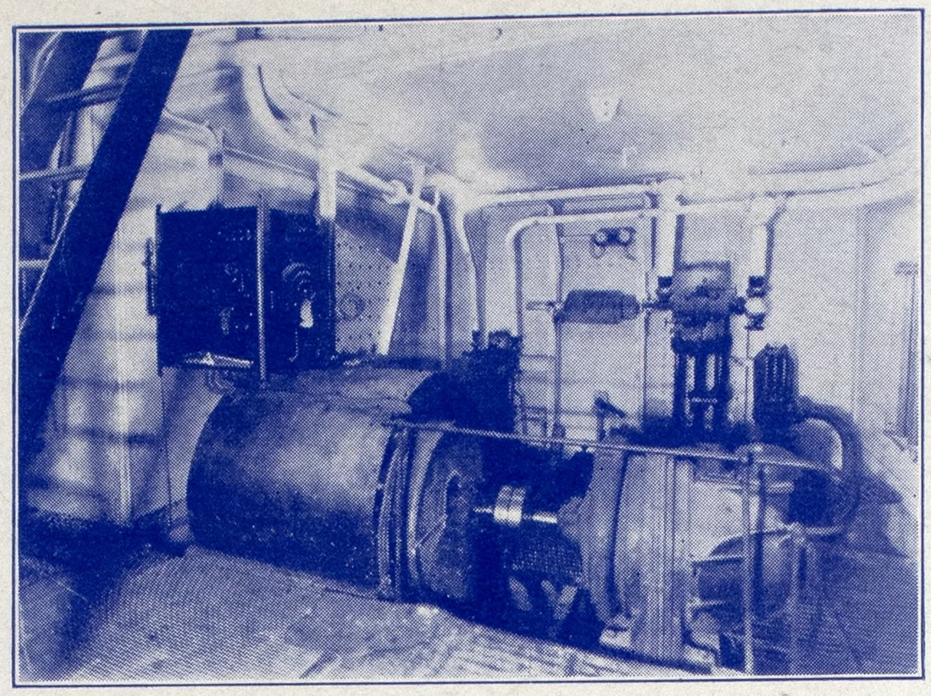

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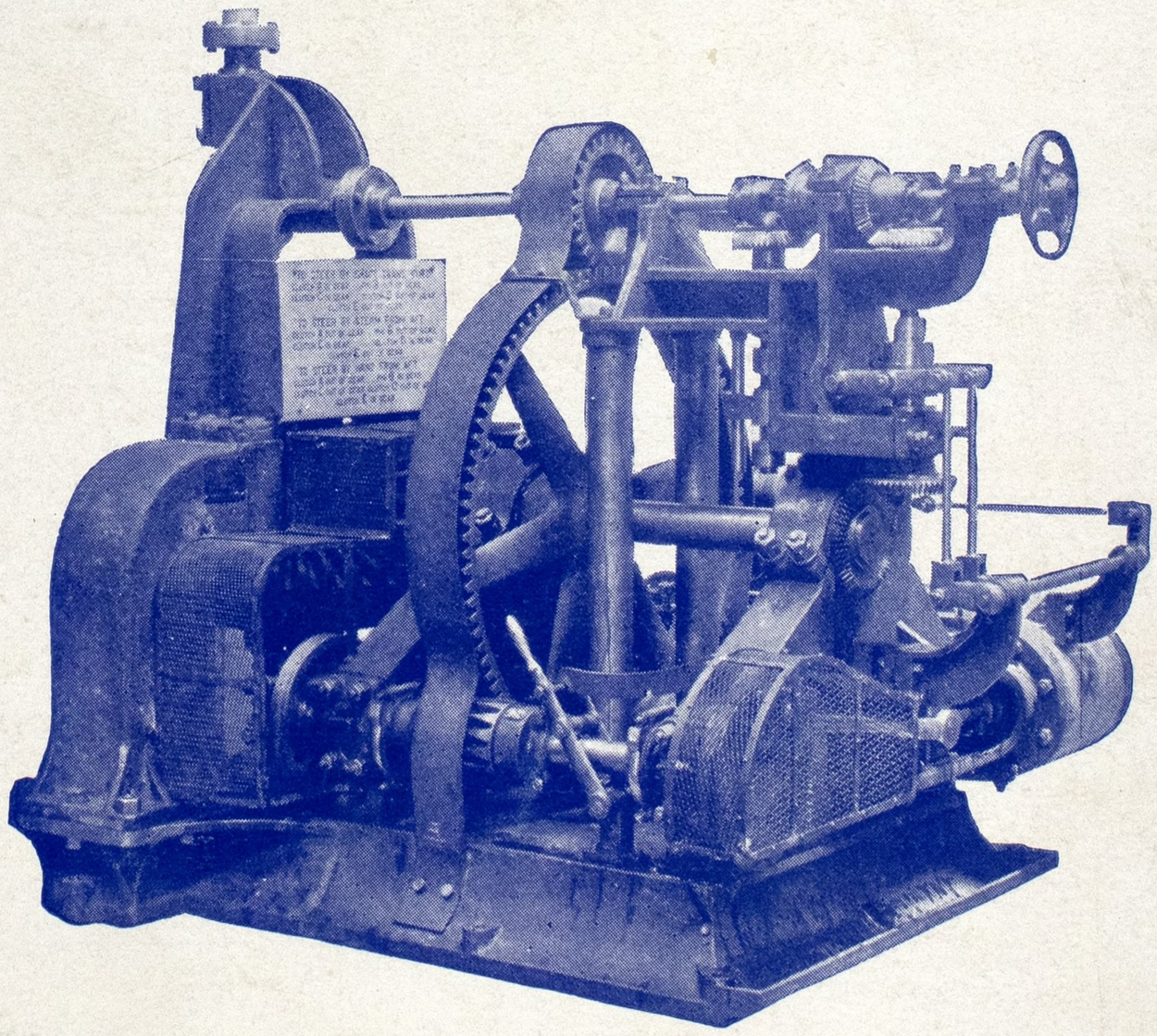

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NOVEMBER, 1929

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